

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XLIII
Number 17

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, OCTOBER 21, 1920

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Spark Plugs



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“How Can We Turn Our Prestige Advertising Into Cash?”

The above topic was discussed by the Advertising Managers' Council of the Motor and Accessory Manufacturers' Association at a session held September 17 and 18 at Cleveland. By invitation of the council, newspapers, magazines, trade journals, direct mail, and outdoor advertising were each represented by a speaker, who was asked to answer the above question.

H. W. Huff, advertising manager of the Detroit Pressed Steel Company, in introducing the subject stated that his investigations indicated “that there was to be a let-up in volume of purely prestige advertising and that he thought all of the advertising managers were confronted with the problem of getting more direct results from the money expended.”

Automotive Industries reports that the representative of general magazines admitted “that this form of advertising was chiefly prestige advertising and it had no immediate solution to offer,” and the spokesman for outdoor display “frankly stated” that his medium could not be used to produce “immediate sales.”

The one form of advertising willing to shoulder the burden of quickly converting inventories into cash is newspaper advertising. The problem of “getting more direct results from the money expended” has one sure answer—**NEWSPAPERS**—and above all others

The Chicago Tribune
THE WORLD'S GREATEST NEWSPAPER

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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XLIII

NEW YORK—THURSDAY, OCTOBER 21, 1920

No. 17

Industrial Depression Does Not Solve Labor Problem

This article is the most timely statement of the labor situation published since the recent business slump. If the workmen give up things at present, keener desire develops later. The discussion should be read by every executive.

By Harry Tipper

THE history of the labor movement, examined through its century of development, shows that the demands of the workers for larger rewards and more effective working conditions have increased with general prosperity and have decreased with the approach of economic difficulty. The same history has shown that during the periods of prosperity employers have acceded to some of the demands of the workers, hoping always to recuperate themselves by a return to the earlier conditions in the periods of economic difficulty. This has not occurred, however, and the improved basis established in the prosperous period has not been changed, to any great extent, in the next period of depression.

The greatest fear of the worker is the fear of being without work, and this fear is sufficiently active during the times of depression to overshadow the objects of his organization and all other matters except those which represent the few deep-seated convictions; so that strikes have been less numerous and of less importance in the industrial countries during any depression and the workers have been willing to increase their speed of operation to maintain their place when work has been difficult to secure.

It is to be observed, however, that these conditions have been temporary and they have not retarded the general rise of labor organizations.

The oldest industrial country, Great Britain, which has passed through more periods of industrial depression, and which has had a more continuous surplus of man power than any other industrial country, is today the most completely organized from a labor standpoint; and its political situation is more definitely affected by the labor power than any other country outside of Russia. As a matter of fact, the progress of labor organizations has been greater and its effect more definitely reflected in the political situation in those countries where the economic conditions have been less favorable and life has not been reasonably full of the conveniences and comforts.

The present state of labor organizations in the United States and the smaller degree of power which they are capable of exercising is due in great measure to the better economic condition of the workers and the presence of a larger amount of convenience and comfort in their living.

This sounds like a paradox, considering the opening sentence of the article which pointed out that labor demands were more active in periods of prosperity and less active in periods of depression. There is no paradox in the matter, however; the changes in the symptoms of industrial unrest, as between the prosperous and depressed periods, are temporary and they serve only to accentuate the desires or make visible the conditions of labor organization. It is only in those countries where the worker must struggle continually against hardship that the demand for improvement becomes sufficiently bitter to develop the organization for this purpose through the highest degree. At the same time, the distance between prosperity and starvation for such workers is so short that the necessity to stay on the job is much greater during the periods of depression. Therefore, in these countries the industrial disputes during such periods decrease very rapidly in number and in importance.

It is necessary to recognize the fact, however, that during periods of prosperity, whenever the power is sufficiently great to permit of the action, the demands from the labor organizations in such countries are more severe and their power more ruthless in its development.

The period of business depression may prove to be a temporary relief from the strikes and other industrial interruptions, but is of no permanent advantage in solving the problem and it does not have any material effect upon the development of labor organizations or the continuance of their demands.

It was quite natural that the revolution in Russia should develop into a complete and radical overturning of the whole social system under which the Russian worker had been obliged to operate. The previous conditions in industry in Russia were worse than those obtaining in any other industrial country in Europe. The bitterness of the worker was greater, and although there was less industrial strife in the way of strikes and interruptions from year to year, the extreme need of the worker for some kind of relief from the oppressive conditions resulted in a destructive change when the opportunity for that release came about.

For a similar reason, it is not surprising to find the Italian worker demanding radical changes in the industrial organization in that country. The character of these changes may be visualized by the demands which are being made upon the government by the commission of workmen from Milan.

1. The Workmen's Council must control the purchase of raw materials.
2. The Workmen's Council must supervise the sale of finished products.
3. The Workmen's Council must fix the price of finished products.
4. The Workmen's Council must superintend the grading of wages.
5. The Workmen's Council must control all goods unloaded.
6. The Workmen's Council must decide what task each workman is better adapted to accomplish.
7. The Workmen's Council must obey the conditions of employment of the industrial establishments.
8. The Workmen's Council must control the general expenses of the establishments and especially limit the expenses

of the present proprietors and directors, who will participate in the profits.

9. The Workmen's Council must decide when new machinery is necessary.

10. The Workmen's Council must supervise hygienic and sanitary conditions in industrial establishments.

11. The Workmen's Council must insist that the proprietors furnish necessary utensils.

12. The employers must not resort to artificial industrial crises.

13. The employers must prevent "dumping."

The conditions of the worker in the Italian industry lacked a great deal of being reasonably sound from an economic, medical or a social standpoint and the radical program just quoted is the natural reflex of such conditions.

The periods of depression which eliminate the industrial interruption to some extent by acting to delay the desires of the labor organization, serve only to emphasize those desires when the next period of prosperity comes along. It is possible to be a good deal more patient in the accomplishment of an ambition which has never been realized, than to be patient when it becomes necessary to forego an ambition that has been realized but cannot be continued.

Wherever changing economic conditions oblige the worker to give up in the least degree the privileges which he has secured in the previous period of prosperity, the result is the gradual development of a keener measure of unrest during that period which makes itself felt in the next advent of more prosperous conditions.

It is rather remarkable, when the fact is considered, that the trade union movement, which began in a small way in the North of England in the first few years of the nineteenth century, should have resulted in these demands of the Italian worker upon the Government in Italy, in the development of the labor party holding the balance of power in English politics, in the social experiments conducted in the newer countries of Australia and New Zealand, and in the general articulation of the demand of the workers in all industrial countries.

It looks as though we were entering upon a period in the United States when the shortage of man-power would be eliminated for the time being, and there would be some surplus of labor. This will lead to the reduction of strikes and other industrial difficulties and we may fall into the error of imagining that this diminution of industrial difficulty indicates a solution of the problem and means a definite change in the labor organization development.

It should be clearly understood that this has not been the case in any previous period and it is not likely to be the case at this time. All that such a period affords, is the opportunity for the manufacturer to lay the basis for the solution of his labor problem at a time when there are no industrial demands pending, and also at a time when the worker is inclined to view such matters with less belligerency and with less bitterness.

This cannot be emphasized too much, particularly in view of the strength and power of the labor and socialist organizations in the other industrial countries and the probability of future developments in their political relations.

The power of the labor organization idea has grown too rapidly to be eliminated or permanently limited by any temporary economic conditions. It can be used to provide the basis for peaceful development, but this can be done only by proper study and experiment in connection with the matter during the quiet period.

Bennett Cup Winner Uses Novel Cooling Equipment

American entries make disappointing showing in Bennett trophy race, only two being able to start; neither finished. Sadi-Lecointe, the winning pilot, covers course in Nieuport biplane at average speed of 168.7 miles per hour. European correspondent tells story of how race was won and lost.

By W. F. Bradley

BY the victory of Sadi-Lecointe, piloting a Nieuport biplane with 300 hp. Hispano-Suiza engine, the James Gordon Bennett trophy has been won for the third time by France and will remain permanently in that country. Sadi-Lecointe's time for the 186.4 miles was 1 hr. 6 min. 17 1/5 sec., giving an average speed of 168.7 miles an hour over the 31-mile course. This was less than the speed predicted, an average of not less than 186 having been expected, and claims of 200 miles an hour having been made for practice work. Bernard De Romanet, on a Spad-Herbemont, finished second in 1 hr. 39 min. 50 3/5 sec. No other flyer covered the full distance.

On the day fixed for the race the competitors had been reduced to three French, two Americans and one Britisher. The American team originally consisted of four: Major Schroeder on Verville biplane, Rinehart on the Dayton-Wright, and the two planes built by the Curtiss company for S. E. G. Cox. Within a few hours before the time limit set for receiving the machines on the ground, Rohlfs, one of the Curtiss pilots, flew from the aerodrome at Villacoublay to Etampes, a distance of about 20 miles, and completely smashed on landing, owing to the collapse of his under-carriage. The second

machine could not be brought over and American contenders were thus reduced to two. An unfortunate impression was created by reason of the hugely exaggerated claims made by the Cox interests for their machines. It was given out that these planes were so fast the pilots could not attempt to land with them and contemplated jumping out with parachutes. This was taken seriously by the French, and Secretary Fandrin issued an intimation that if this were done the pilots would be dealt with seriously on both criminal and civil charges.

Rohlfs's accident must be attributed to a defective under-carriage. He handled his machine in an excellent manner, appeared to touch ground normally, then his under-carriage crumpled up and the machine turned over on its back. Rohlfs appeared at first to be seriously injured, but 48 hours later was out of the hospital and watched the race.

Rinehart, on the Dayton-Wright, was the first American to get away in the race. His machine, designed and built by himself and Milton C. Baumann, was the most original on the ground and attracted a large amount of attention and much favorable comment from French experts. It is a monoplane with very small surface, the wing spread being 271 in. and the depth 42 in., having no external stays or wires, and with the pilot completely enclosed in the fuselage. The wings are slightly concave on each side and have a variable incidence, being negative when the machine is in flight. Another feature of great interest is the landing gear, which is wound up into the fuselage so that the encased wheels cover the openings provided for the entrance of the carriage. The wonderfully fine aluminum coated varnish finish of this machine attracted much comment. The Dayton-Wright has a six-cylinder Hall-Scott 5 by 7 in. engine.

Rinehart was handicapped by reason of not having tried out his machine sufficiently. He knew that he did not have the correct pitch of propeller for the best speed, but was unable to make experimental flights for fear of smashing up when making landings on the rather rough field. His trouble in the race was a wedged rudder control, which made it impossible for him to make left-hand turns. Owing to this he abandoned before completing the first of the three laps required for the race.

Major Schroeder also went out on the initial lap owing to overheating of his engine. The 12-cylinder 600 hp. Packard appeared to have an unusually high compression and radiating surface had been cut down to the lowest limit in order to reduce head resistance. The engine was run on gasoline with a small percentage of

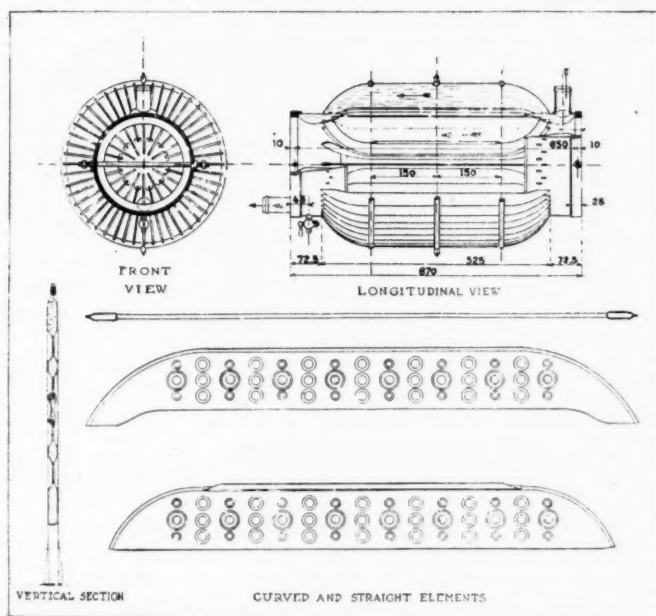


Fig. 1 (above)—Lamblin radiator used on winning Nieuport biplane. Fig. 2 (below)—Section of one of radiating fins on Lamblin radiator

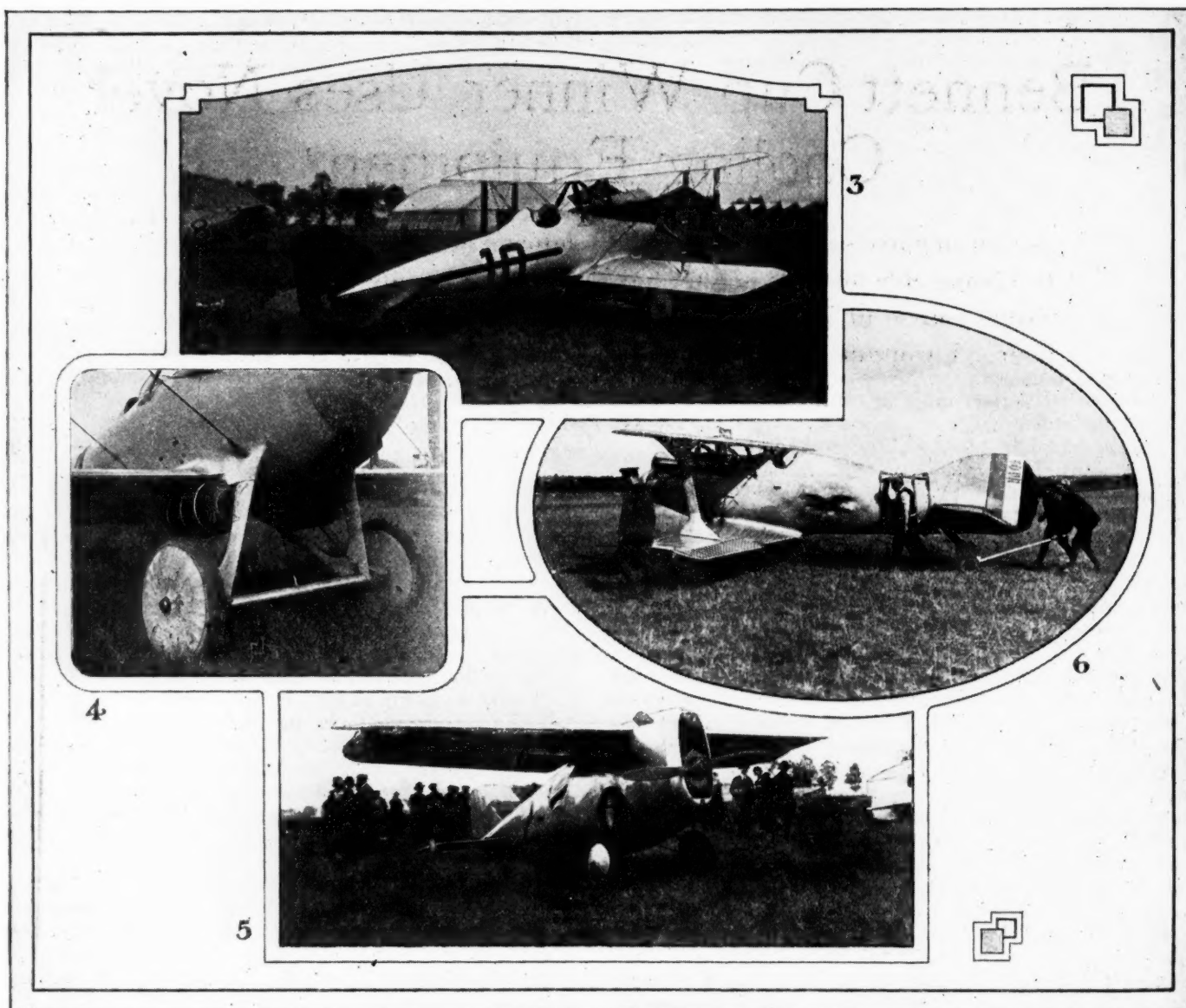


Fig. 3—The winner of the Gordon Bennett cup. Fig. 4—Oil radiator and two Lamblin water radiators on Nieuport machine. Fig. 5—Dayton-Wright monoplane which carries pilot inside fuselage; collapsible landing gear is also illustrated. Fig. 6—Major Schroeder's Army biplane equipped with Packard 600-hp. engine

benzol mixed with it. When Schroeder found that his engine was heating, he went higher in the hope of getting a cooler atmosphere, but the overheating having continued and considerable water having been lost, he deemed it advisable to abandon.

Considering the amount of money spent in building and sending the United States machines to France, the result is distinctly disappointing. Major Schroeder's machine is said to have cost the War Department \$1,500,000 to build, ship, and enter in the race. There was insufficient preparation for the race, and even assuming that the American planes were faster than the others, it is doubtful if their pilots could have won owing to their lack of knowledge of the course.

While France won the race, and Sadi-Lecointe covered the distance without a mishap, the two other machines were not without trouble. Kirch, on a Nieuport practically identical with that of the winner, made the fastest time of the day when he covered the initial round of 100 kilometers in 21 min. 29 sec., or at an average of 173½ miles an hour. The actual start being taken as the machine cut the line in full flight, only one turn is included in this time, so that it is only very slightly less than the maximum time on the straightaway. After two

rounds, or 124.2 miles, in 48 min. 52 3/5 sec., Kirch landed with his plugs oiled up and did not continue the race.

The third French machine, a Spad-Herbemont, flown by Bernard De Romanet, broke an oil pipe and after stopping to repair, finished the race. The pilot was blinded with oil and made his final landing with his eyes shut. The Spad was admittedly slower than the Nieuports, for its head resistance was greater and its weight higher.

The winning Nieuport is an army type scout plane with reduced wing area, the surface being about 129 sq. ft. and the total weight 900 lb. In cutting down the surface, the upper wings had been clipped, until these were slightly shorter than the lower ones. All three French machines, as well as the English Martynside, which went out on its first lap with a broken oil pipe, were equipped with the 8-cylinder Hispano-Suiza 5.5 by 5.9 in. engine. This engine develops 310 hp. at 1800 r.p.m. with a compression of 75 lb. per sq. in. The engine on the English Martynside, having been built during the war for high altitude flying, had a slightly higher compression.

France having secured permanent possession of the Gordon Bennett cup, this trophy will not again be put

up for competition, but the contest in all probability will be replaced by some other international event in which speed will be the dominating factor, but with limitation of piston displacement and stipulated wing area. The old rules, which gave absolute liberty, tended toward the use of the biggest possible engine on the smallest possible plane and produced fast machines which could not be landed except at very great risk to both pilot and machine.

The Nieuport planes did not have the usual radiator in front of the fuselage, but employed the Lamblin coolers, two of which were mounted immediately under the lower wings, to the left and right of the fuselage. Figs. 1, 2 and 4 show the construction of this cooler. The Lamblin cooler consists of two concentric collectors united by a series of thin copper radiating fins through which the water circulates. A cooler of this type, with 130 elements, contains one gal. of water, has a radiating surface of 710 sq. ft. and weighs 37 lb. with attachments.

An investigation into the causes of the failure of the American contenders to make even a reasonable showing in the Gordon Bennett race shows a deplorable lack of preparation. Major Schroeder and Rinehart had never been over the course and did not know any of the landmarks, whereas the Frenchmen had practised for weeks in advance and knew every inch of the way. It appears that these two American machines had never been flown and there was no reliable data regarding their performance. Rinehart claims that his rudder controls jammed so that he could not make a left-hand turn, yet it was observed that he made a perfect landing with a side wind. There is some mystery regarding the overheating of the Packard engine on the Verville machine. Evidently the fuel cannot be blamed, for in order to take no chances with gasoline procurable in France, fuel was brought specially from the United States and a truck

sent specially from Paris to Antwerp to bring it to the aviation field. Even if a miscalculation had been made in the radiating surface, a single preliminary flight ought to have revealed this.

The mishaps to the Curtiss machines, of which Mr. Cox, their backer, was the victim, are largely attributable to jealousy between the two pilots. It appears that when the two machines were shipped from New York the wings for Clarence Coombs's machine were "accidentally" left behind. When Rohlfs smashed up two days before the race the wings of his machine were intact and might have been fitted to the fuselage of Coombs's machine. Twelve hours were available for this work, and a staff of 30 mechanics was on hand. For some reason or other this was not done, and America started in the race with only two machines. Rohlfs only made one flight on his racing plane previous to going from Villacoublay to Etampes, and on this occasion took his parachute with him. Mr. Cox, who has footed the bills for these two machines without having had the pleasure of seeing either of them start in the race, declares that he will bring legal action against the Curtiss company.

Following is a summary of race—distance 186.4 miles:

1. Sadi-Lecointe, on Nieuport biplane, Hispano-Suiza 300 hp. engine.....1:06:17 1/5
 2. Bernard De Romanet, on Spad-Herbemont biplane, Hispano-Suiza 300 hp. engine..1:39:50 3/5
- Kirch, Nieuport biplane, Hispano-Suiza 300 hp. engine, abandoned after two laps with defective plugs.
- Major Schroeder, Verville biplane, Packard 600 hp. engine, abandoned on first lap with engine overheated.
- H. M. Rinehart, Dayton-Wright monoplane, Hall Scott 6-cylinder 250 hp. engine, abandoned on first lap with wedged rudder control.
- L. P. Raynham, Martynside biplane, Hispano-Suiza 300 hp. engine, abandoned first lap with broken oil pipe.

Byron Four Wheel, Semi and Pole Type Trailers

BYRON trailers are now being built by the Byron Engineering Works in various designs of the 4-wheel reversible type, as well as in semi-trailer and pole types. The line is intended primarily for heavy duty hauling, and its chief distinctive features are found in the steering mechanism. The ball and socket joint keeps the steering gear in alignment regardless of the position of the trailer frame in striking bumps or in rocking from side to side. Enclosed heavy coiled springs absorb road shocks and prevent bending of the steering arm. The swinging steering arm connects the steering mechanism on the axle to the steering parts on the frame. It swings parallel to the action of the springs and preserves the steering gear alignment regardless of spring deflection. An independent steering arm connects the steering gear to the drawhead or frame as required and allows the trailer to be steered by hand independent of the drawbar either in going forward or in backing. This eliminates all necessity for unhooking the trailer from the truck in maneuvering, and prevents loss of time as well as danger of injury to the operator. Still another distinctive feature is the drawhead connection. It locks the drawbar in place automatically so that the trailer cannot be detached by accident after once being locked to the truck. The semi-trailer and pole types each have distinctive features similar to those of the 4-wheel reversible model just described.

Extra heavy rolled section channel steel is employed for the frame, which is heavily reinforced and solidly braced. Steering arms and spindles are chrome vanadium steel. Timken bearings are used throughout. Solid pressed-on

tires of standard tread are used. Byron trailers are being built in 3-ton and 5-ton capacity in the 4-wheel reversible type; 6-ton and 4-ton in semi-trailer models, and 4-ton and 2½-ton pole trailers.



Byron four-wheel reversible trailer

New Crawler Tractor Has Novel Track Assembly

In this California product, each assembly is an independent, self-contained unit, consisting of a track, a frame, two idlers and a driving gear. The track links are manganese steel castings shaped so that they will interlock when in contact with the ground, forming a rigid track.

THE Henneuse 40, a tractor of the crawler type, having some original features, was exhibited at the California State Fair in Sacramento. This machine is manufactured by the Henneuse Tractor Co., from designs of C. A. Henneuse. In its present form the engine, transmission and radiator are mounted on a steel channel frame; carried at the rear by two independent crawler elements and in front by a single tiller wheel. A model without the tiller wheel, but otherwise the same, will be built in the near future.

The most interesting features of the design are to be found in the track assemblies. Each assembly is an independent, self-contained unit, consisting of a track, a frame, two idlers and a driving gear. The track links are manganese steel castings shaped so that they will interlock when in contact with the ground, forming a smooth and rigid track which is the equivalent of a solid steel rail. This type of track bridges over any slight inequalities in the surface of the ground, thus reducing the rolling resistance to a minimum.

The track frame consists of two alloy steel castings and four spacing members. The two idlers are mounted at opposite ends of the track frame, with the driving gear between them. The idlers serve to guide and support the track and to carry a part of the weight of the machine. The greater part of the weight is carried on the driving gear at the center of the track. This gear consists of a manganese steel rim bolted to a malleable iron hub. The outer circumference of the rim is provided with involute teeth which engage with rack teeth formed on the track links, causing it to roll on the track after the manner

of an engine on a rack railway. The rack and pinion effect thus produced is said to be quieter, steadier, and more efficient than the chain and sprocket action of other types of track. An internal gear is formed on the inner circum-

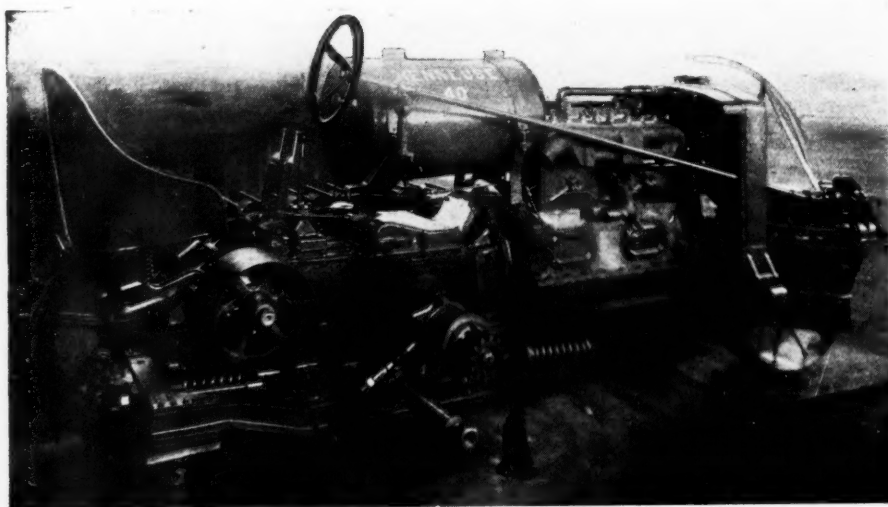


Radiator with removable sections

ference of the rim of the driving gear and is driven by the hardened, steel bull pinion. The internal gear and bull pinion are enclosed to exclude dust and to retain lubricant.

The driving gear and idlers are all fitted with Hyatt roller bearings. The bearings in the idlers are mounted on hardened solid steel shafts and those in the driving gear run on a hardened cylindrical steel sleeve. The track assembly is made up as a separate unit and is attached to the tractor by slipping this sleeve over the end of the rear axle. The assembly is retained in place by a nut and washer on the end of the axle. The entire track assembly is free to oscillate about the rear axle, a feature which aids in the passage over large obstacles and which tends to keep the track in contact with the ground, for its entire length, the greater part of the time.

If it is desired to use the machine for road hauling, the track assembly



Right hand track removed, showing bull pinion, rear axle, pulley and spring draw bar

can be removed and a rubber tired steel wheel substituted.

The same principle of unit construction is found in the transmission assembly. It is an entirely separate self-contained unit securely bolted to the frame and to the engine flywheel housing.

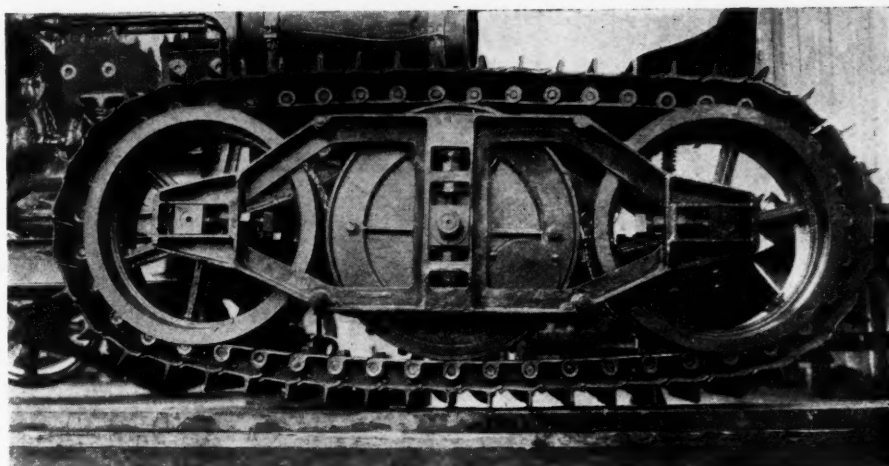
The engine clutch is of the dry plate type, made by the Twin Disc Clutch Co. It is enclosed in the transmission case bell-housing and is controlled by a double-acting pedal conveniently placed for the operator.

The sliding change-speed gears give three forward speeds and a reverse. The gear-shift is of the automobile type, conforming to S. A. E. standards. At the governed engine speed of 850 r.p.m., and with 13 tooth bull pinions, the tractor speeds are: Low, $1\frac{3}{4}$ m.p.h.; intermediate, $2\frac{1}{2}$ m.p.h.; high, $3\frac{1}{2}$ m.p.h., and reverse, 2 m.p.h. The bull pinions may be conveniently removed through hand-holes in the bull gear hubs and 11, 12 and 14 tooth pinions substituted, giving a wider range of speeds.

The distribution of power to the tracks is controlled by two multiple disk clutches running in oil, one for each track. Each clutch is operated by a hand lever, one being mounted at the right and the other at the left of the gear-shift lever. A light forward pressure on a lever engages the corresponding clutch. Pulling a lever back releases the clutch and applies a brake to the track on that side.

The belt pulley is located on the right-hand side of the machine, at the rear. Its shaft is driven from the main transmission shaft through a pair of miter gears. It runs at engine speed and is controlled by the engine clutch, but may be disconnected through a simple device which permits it to remain stationary when the tractor is used for hauling purposes. All of the transmission shafts and gears are fitted with ball and Hyatt roller bearings.

The engine is the Waukesha Model EU of 5-in. bore and $6\frac{1}{4}$ -in. stroke. It is a vertical, four-cylinder, L head engine, equipped with a governor which is normally set for an engine speed of 850 r.p.m. It has a hot-spot manifold and is specially designed for burning kerosene. The accessories regularly supplied are the Berling magneto with



One track assembly

impulse starter, Stromberg carbureter and Bennett air cleaner. The flywheel housing is rigidly bolted to the transmission case, and the front end of the engine is carried in a trunnion bearing mounted on the frame. This forms a three-point suspension and relieves the engine from all of the twisting strains to which the tractor is subjected.

The radiator tanks and frame are made of cast iron and the design is unique in that they are cast in one piece. A more rigid construction and one requiring less machine work is thus obtained. The upper tank has an extension to the rear under the hood, for an ample supply of cooling water. The filler hole is large and has a hinged cover. The lower tank is made with a depression in the center, forming a sump for the accumulation of scale and sediment. The drain cock at the bottom of the sump is of large size, $\frac{1}{2}$ -in., to prevent clogging. The radiator core is of the Spirex type built by the Modine Mfg. Co. It is made in six sections, five of which are considered sufficient to cool the engine in the hottest weather. An injured section can be easily removed and another one inserted, or the openings in the tank may be temporarily plugged. The gaskets are of small size and can be kept tight without difficulty. The radiator is mounted on C-shaped springs which protect it from shocks and twisting strains.

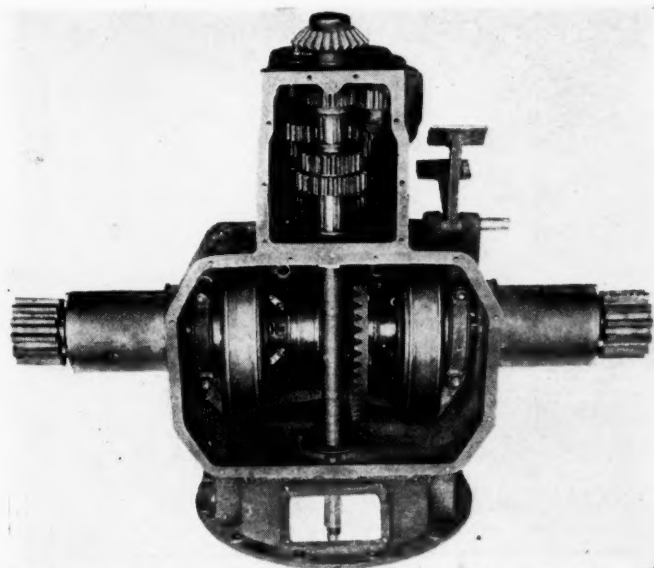
The single front wheel is supported on helical springs and turns on a ball bearing circle of large diameter. It is equipped with Hyatt roller bearings and is mounted slightly to the rear of the center, giving a caster effect which aids in steering. The steering gear is of the worm and sector type, operated by a hand-wheel. Steering requires but very little effort, and the machine can be easily guided by one hand.

The frame of the tractor is made of standard steel channels securely riveted and bolted together. At the rear the machine is carried on a system of helical springs, which, with the spring mounting of the front wheel, constitutes a complete spring suspension.

The drawbar is a separate unit assembly. It is of the pivoted type and contains a nest of helical springs which are under compression when the machine is pulling a load. The drawbar head is supported by the rear end of the frame and its swing may be limited by inserting pins in the rear frame cross member. The springs absorb the shocks due to the obstacles encountered by the load.

A well cushioned bucket seat is provided for the operator, mounted on a helical spring so arranged that the seat cannot fall should the spring break.

The fuel tank has a capacity of 23 gal. of kerosene and 6 gal. of gasoline. The weight of the tractor with tanks and radiator filled is about 8000 lb.



Transmission, showing changespeed gears, track clutches, bull pinions and master clutch pedal

All-Metal Airplane Comprises Novel Engineering Features

The following article describes in detail the construction and performance of the JL all-metal airplane, which has recently aroused considerable interest in aircraft circles. Among the chief mechanical features of this design are the self-supporting, deep sectioned, internally trussed wings.

AMONG the most interesting of recent aircraft engineering products is the JL all-metal airplane. The construction of this machine presents many novel features of detail. The craft was designed especially for passenger traffic, and particular attention was given to the arrangement of the passenger and pilot cabins. Widespread attention was first attracted to the all-metal type machine when it was put into use on the New York to San Francisco mail carrying route. From an engineering standpoint it is of special interest.

Fig. 1 shows the latest design JL all-metal commercial type airplane, known as Type F. This is a monoplane and is fitted with a six passenger cabin. Among the mechanical features of this plane may be mentioned the self-supporting, deep sectioned, internally trussed wings, which have a thick rounding leading edge. The design of these wings is similar to that of the Junkers military

airplane which was described in AUTOMOTIVE INDUSTRIES of June 10 last. Among the advantages claimed for the all-metal construction is that it is practically immune to atmospheric influences and therefore can stand for long periods in the open air without injury. Also, since there is no rigging, the expensive operation of rigging in assembling the plane is eliminated, and the plane is very easily taken apart. The construction is said to be particularly well adapted for use in the tropics, for the reason that termites and other insects cannot destroy the structure. The weight of the Junkers plane is said to be no greater than that of a standard monoplane.

The dimensions of the passenger carrying monoplane herewith shown are as follows: Span, 48.55 ft.; length overall, 31.5 ft.; overall height, 10.2 ft. The engine is a 160 hp. Mercedes or a 185 hp. B. M. W. motor. Wheel control is used, and the control column may be mounted

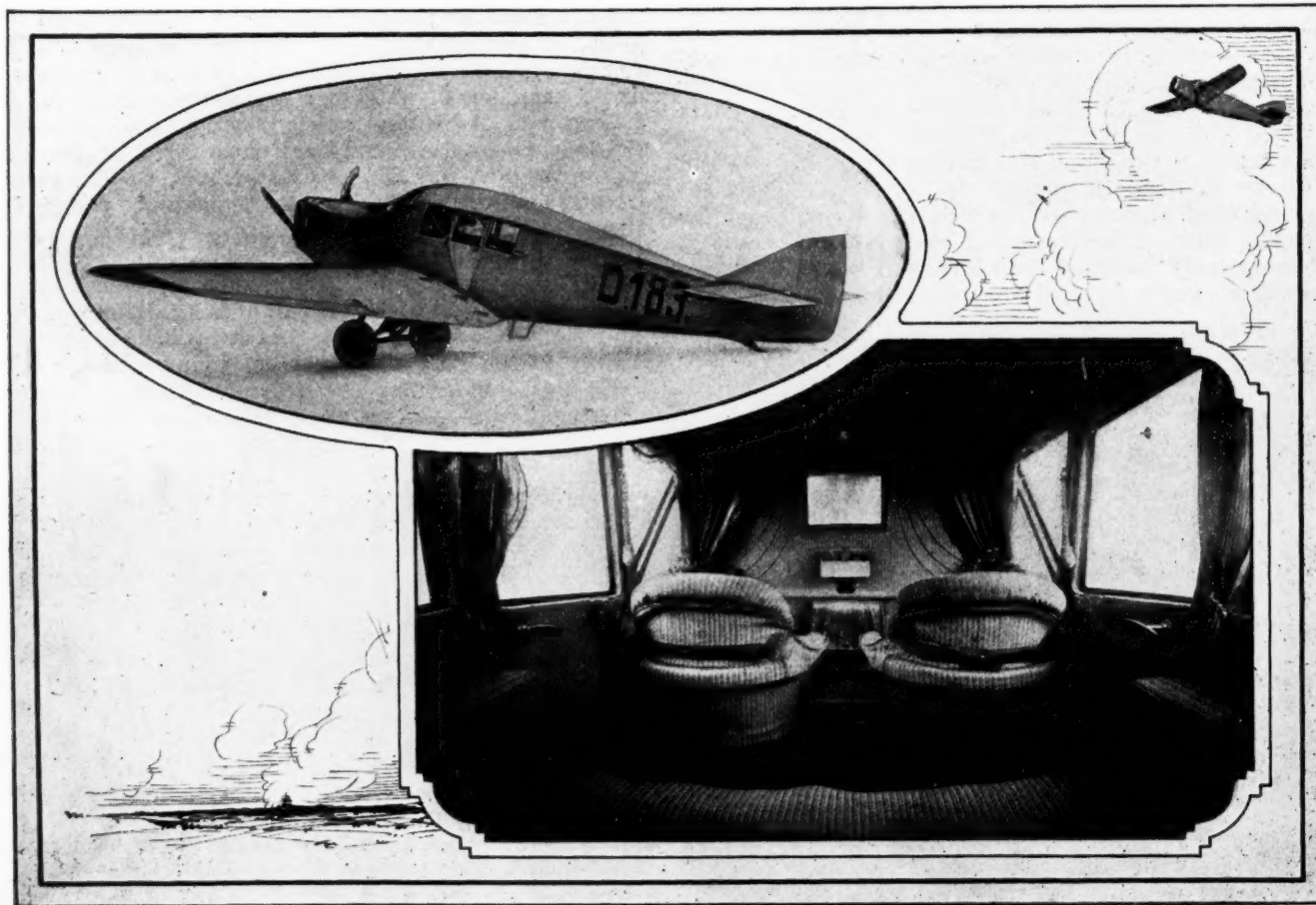


Fig. 1—Type F, all-metal commercial type airplane. Fig. 2—Interior view of cabin

either on the right or left-hand side in the pilot's cabin. For long distance flights, a duplicate control for a second pilot is provided. Two separate fuel tanks, each of 45 gal. capacity, are located in the wings. The fuel supply carried is sufficient for 8 hours' flight. The special design of radiator is mounted, due to Prof. Junkers, with air nozzle regulation.

The illustration herewith shows the land plane, but the machine can be easily transformed into a seaplane by replacing the wheels of the landing gear with floats of duralumin.

The following performance figures are given for this machine:

The maximum useful load, including 6 persons with their luggage, amounts to 2267 lbs., and fuel for 8 hrs. to 1133 lbs., making a total of 3400 lbs. of low carriage. With a 160 hp. engine, the plane will attain an altitude of 9140 ft. in about 40 min. When fitted with floats, the

maximum useful load capacity is limited to 2041 lbs., and the fuel supply, sufficient for 4 hrs., to 589 lbs., making a total of 2630 lbs. With 185 hp. engine, the plane attains an altitude of 9000 ft. in about 40 min. The maximum speeds are 107 m.p.h. for the land plane and 106 m.p.h. for the seaplane.

A JL commercial airplane, fitted with 185 hp., B. W. M. engine, carrying a load of 8 passengers, attained a height of 22,000 ft. (6750 m.) above sea level; this constituting a new world's record.

Fig. 2, herewith, shows an interior view of the passenger cabin from the rear. Four comfortable seats and the passengers are not compelled to keep their seats while in flight. Luggage is carried in a special compartment behind the cabin and is so arranged that it can be easily strapped in place. By removing the chairs and furnishings, the cabin can be easily adapted for carrying mail and other goods.

Table of Data Regarding the Large and Small Airplanes in the British Air Ministry Competitions

NAME	HORSEPOWER		Area sq. ft.	WEIGHT IN LB.								Fuel used in 7 hr. Cruising			Speed in m.p.h. Cruising					Landing, yards from mark	Lb. per HP.				Lb. per Sq. ft.	
				Total						Useful Load					Total		Useful Load									
	Nominal and type of engine	Actual		Empty (including water)	With fuel	Perform- ance test	Reliability test	Certificate of Air- worthiness	Perform- ance test	Reliability test	Petrol	Total	Oil	W. G.	Indicated	Actual	High	Low	"Get off" feet above ground		Perform- ance test	Reliability test	Perform- ance test	Reliability test	Perform- ance test	Reliability test
Central Aircraft "Contour".....	2-160 Beard- more	354 @ 1250 rpm.	805	4996	5840	7250	7250	7250	LA (d) 1210	RGE (d) 1210	148.5 159.5	11	(d) 7.6	61	63	89	48	0	231	20.48	20.48	(d) 3.42	(d) 3.4	8.10	.10	
Handley Page "W.G."...	2-450 Napier "Lion"	1008 @ 2200 rpm.	1456	7850	9843	11443	12500	12500	1400 (e) 1618	2675	279 288	9	9.2	80	84	119	55	74	263	11.35	12.40	1.60	2.05	7.86	8.58	
Vickers-Vimy "Commercial"	2-350 Rolls Royce "Eagle"	704 @ 1800 rpm	1335	7790	9257	11057	11057	12500	1600	1600 (f) 2860	240 252.75 (f) 294	12.75 (f) 9.7	6.3 (f) 9.7	80	84	103	50	26	308	15.71	15.71 (f) 17.75	2.27 (f) 4.06	2.27 (f) 4.06	8.28 (f) 9.36		
SM ALL AEROPLANES																										
Austin "Kestrel"	160 Beard- more	177 @ 1250 rpm.	417	1966	2321	2721	2740	2740	200 (g) 181	219 (g) 200	63.55 67.275	3.725	(g) 8.0	81	83	110	45	14	204	15.37	15.48	1.02	1.15	6.52	6.57	
Avro Triplane....	230 Siddley "Puma"	245 @ 1400 rpm.	498	2460	3064	3683	3683	3666	419 (h) 402 (i) 397	419 (h) 402 (i) 380	105 109.5	4.5	3.7 (i) 3.5	79	83	96	51	1	239	15.03	14.96	1.62	1.55	7.39	7.36	
Bristol.....	230 Siddley "Puma"	245 @ 1400 rpm.	566	2654	3190	3590	3591	3590	200	200	85 90.18 (k) 88.58	5.18	2.2 (k) 2.4	82	86	108	49	19	314	14.65	14.65	.82	.82	6.34	6.34	
Sopwith "Antelope"....	200 Wolsley Hispano "Viper"	210 @ 2000 rpm.	531	2387	2817	3217	3350	3350	200	333. (l) 433	70.5 77.625 (l) 83.75	7.125	4.3 (l) 5.1	80	84	110	43	23	188	15.32	15.95 (l) 16.43	.95 (l) 2.00	1.50 (l) 2.00	6.06 (l) 6.49		
Westland "Six Seater"...	450 Napier "Lion"	504 @ 2200 rpm.	726	3823	4559	5559	5852	5850	800 (m) 840	1133 (h) 1131	128 131	3	(h) 8.6	86	90	118	46	23	235	11.03	11.61	1.67	2.24	7.66	8.06	

EXPLANATORY NOTES

The reference letters shown on the table refer to the figures directly below them:—

(a) Weight of useful load carried on reliability trial divided by the gallons of fuel consumed—given to the nearest figure in the first place of decimals. The useful load is obtained by deducting from the total weight of the machine, as on the test, its weight with fuel for 450 miles at 80 m.p.h. but without load, and a weight of 200 lb. to represent the pilot and his gear.

(b) Shown to the nearest mile.

(c) Shown to the nearest foot.

(d) This machine carried only enough fuel for 315 miles at 63 m.p.h. These figures are not therefore comparable with the similar figures for the other machines.

(e) Includes an allowance of 218 lb. for excess fuel carried.

(f) These figures show the estimated results if the machine had been loaded up to the full Certificate weight for the reliability trial.

(g) Includes a deduction of 19 lb. for short fuel carried.

(h) Corrected to Certificate of Air worthiness weight.

(i) Includes a deduction of 22 lb. for short fuel carried.

(k) Actual duration of reliability test was 7 hr. 5 min. These figures are corrected to 7 hr.

(l) These figures show the estimated results if the machine had been loaded up to the full Certificate weight, which was increased by 100 lb. after the reliability test had been carried out.

(m) Includes an allowance of 40 lb. for excess fuel carried

Experiments With and Practical Use of Superchargers in Germany

When the armistice was signed, the French and American engineers had practically completed their experiments on the first superchargers, but the Germans were already making use of this device. Here is told the story of the experiments on the other side of the battle line.

By Eric Hildesheim*

AT the time the armistice was signed the Rateau turbo compressor developed in France and two American superchargers, the Moss, developed by the General Electric Co., and the Sherbondy, had passed the experimental stage, but neither of these had been put into service at the front. On the other hand, the Germans had for some time previously equipped their giant aircraft with superchargers. Super-dimensioned and super-compressing 6-cylinder vertical type engines, such as the B. M. W. and the Maybach, were employed almost exclusively on their scouts of the late war period.

The development of superchargers paralleled that of multiple engined airplanes, and blowers were commonly used on single units of twin engined, interplane "power egged" aircraft. For instance, an A. E. G. biplane equipped with two 250 hp. supercharging Mercedes engines, on July 30, 1919, established an altitude record of 20,000 ft. for a

flight with eight passengers. Besides, it is known that the Siemens-Schuckert double rotary engine, which was Germany's most successful scout power plant during the late war period, was equipped with a supercharger of the same make.

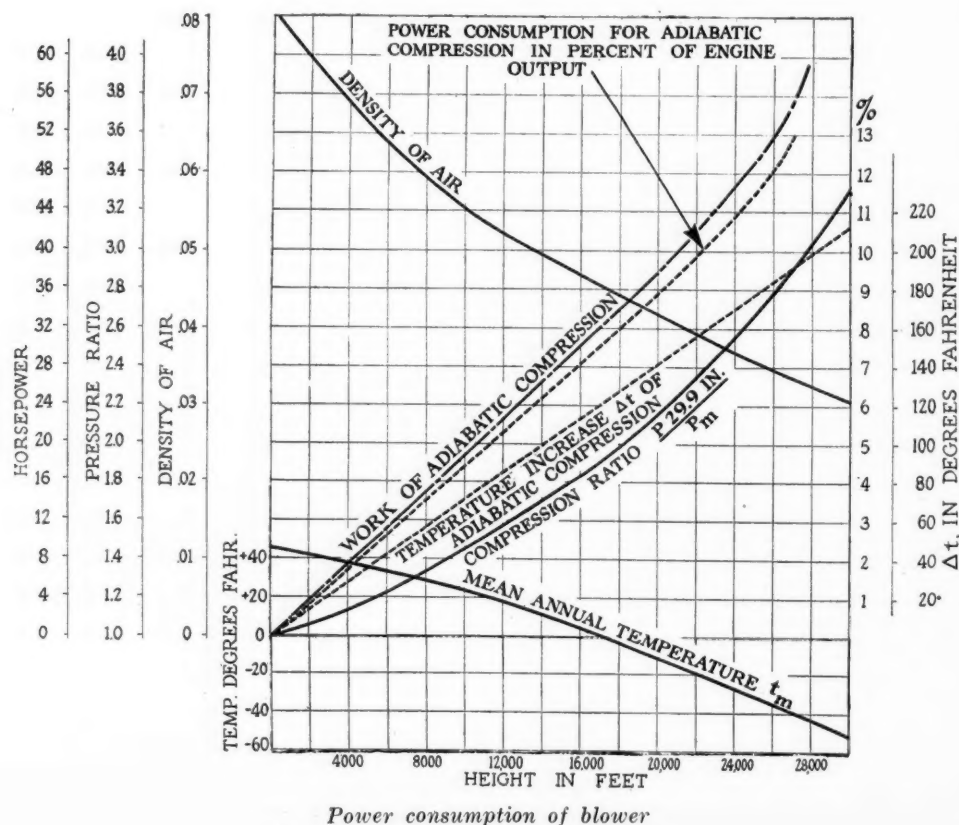
Experiments with superchargers were started by the well-known Swiss firm of Brown, Boveri & Co., Zurich, at its German branch in Mannheim, upon the suggestion of its former Italian representative, W. G. Noack. Noack was engaged in experimental work on giant aircraft at the Flugzeugmeisterei in Adlershof and, together with others, he has published a number of articles on the subject of supercharging in the *Zeitschrift des Vereines Deutscher Ingenieure, Motorwagen und Flugsport*, upon which the following article is based.

Engineer Noack submitted his first plans to the Inspection Department of the German Aircraft Service in January, 1917. While these plans were being carried out at the branch factory of Brown, Boveri & Co., the rotary

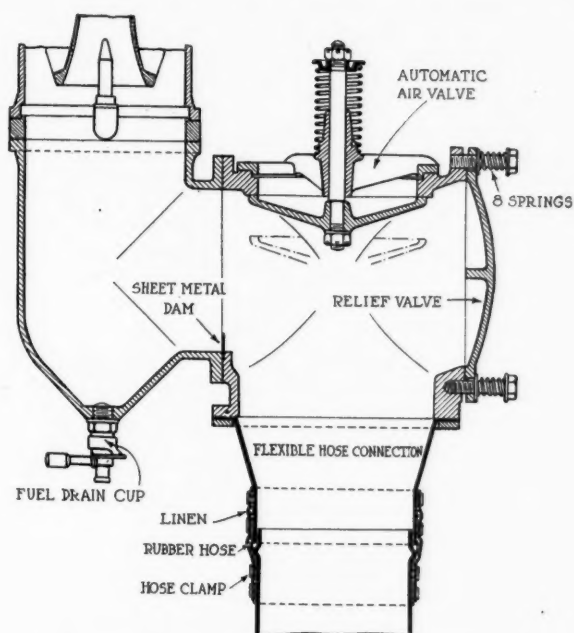
aircraft engine designer, Otto Schwade in Erfurt, worked along the same lines. The two large German electrical firms, the A. E. G. and the Siemens-Schuckert, entered the field of supercharger development at later dates.

A supercharger supplying the engine with compressed air at a substantially constant pressure of about one atmosphere, irrespective of the altitude, the engine may be operated continuously on the mixture for which it has been adjusted on the test stand, provided the temperature remains constant. All that is required to make it possible to fit aircraft engines with a supercharger is to provide pipe connections on the carburetor air inlet.

For single engined aircraft the Germans couple the supercharger or blower directly to the engine itself, while in the case of multiple engined aircraft they use a central supercharger which is driven by a separate power plant or from the joint transmission gear, where one is fitted. Engine manufacturers expressed concern that the practice



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Compressed air connection to carburetor for a 260-hp. engine

of connecting a single supercharger to the engine crankshaft at the opposite end from the propeller would entail excessive vibration and ultimately result in breakage of the crankshaft. Therefore, in the Siemens-Schuckert model the supercharger is driven from the propeller end through intermediate gears, the Brown-Boveri concern employs a spring coupling and the A. E. G. an automatic centrifugal clutch between the rotor and the crankshaft. The clutch of the last mentioned supercharger, as well as that of Schwade, slip when the driving torque exceeds a certain value, and drive the rotor of the supercharger as soon as the engine speed exceeds 600 r.p.m. The use of this clutch prevents shocks on the supercharger when starting the engine.

Where a separate motor is employed for driving the supercharger no clutch or elastic coupling is required, but in that case the motor must be provided with a fly-wheel in order to prevent stripping of the teeth in the reduction gear wheels. Where a single supercharger is used, the carburetor is generally connected directly to the delivery side of the blower, but sometimes a spring loaded blow off valve or non-return check valve is inserted between the carburetor and the supercharger or non-return check valve is inserted between the carburetor and the supercharger to take care of the excess pressure in case of backfires through the carburetor.

Air Connections to Multiple Engines

In multiple engined aircraft each motor is provided with a pipe coupling, containing a relief valve of considerable size, a throttle valve for shutting off the compressed air, and an automatic air admission valve. Through the latter the engine draws air directly from the atmosphere when the supercharger is not operating. When the pressure supplied by the supercharger exceeds the atmospheric pressure, the air inlet valve closes automatically and air from the supercharger is fed to the engine.

For operating in connection with a supercharger, some changes must be made in the carburetor. All of the parts through which air could escape from the inlet passage to the atmosphere must be rendered absolutely air-tight. Thus it is generally necessary to fit a detachable cap over

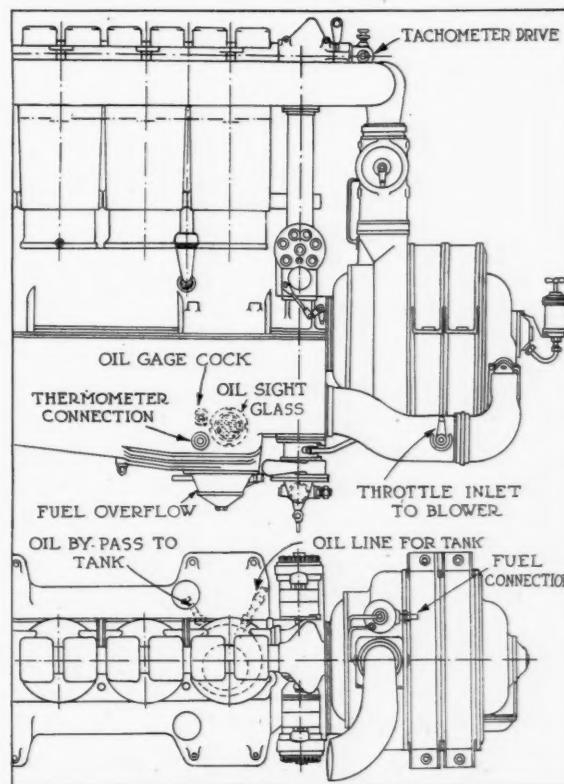
the end of the float valve stem guide, and the upper portion of the float chamber must be placed in communication with the delivery side of the blower by means of a small pipe. The same applies to the fuel tank which feeds directly to the carburetor. With the pressure in all of the chambers connected with the carburetor equalized, the effect of the varying atmospheric pressure is eliminated, and the float and nozzle operate exactly as on the test stand. The German practice is never to keep the main fuel tank under pressure, but to arrange the tank for suction or low pressure.

At low altitudes only a small increase in pressure is required to charge the engine cylinders to a pressure of one atmosphere. Therefore, if the supercharger is direct-coupled to the engine and operates at full capacity all the time, it produces an excess pressure which must be relieved through a valve. It is more economical to regulate the pressure at the carburetor air inlet by means of a throttle in the suction pipe of the supercharger than by a throttle on the delivery side of the supercharger, as in the former case less air passes into the supercharger, and the power required to operate it is reduced. Usually a slide valve is employed for throttling, which is operated either by hand or automatically by the atmospheric pressure.

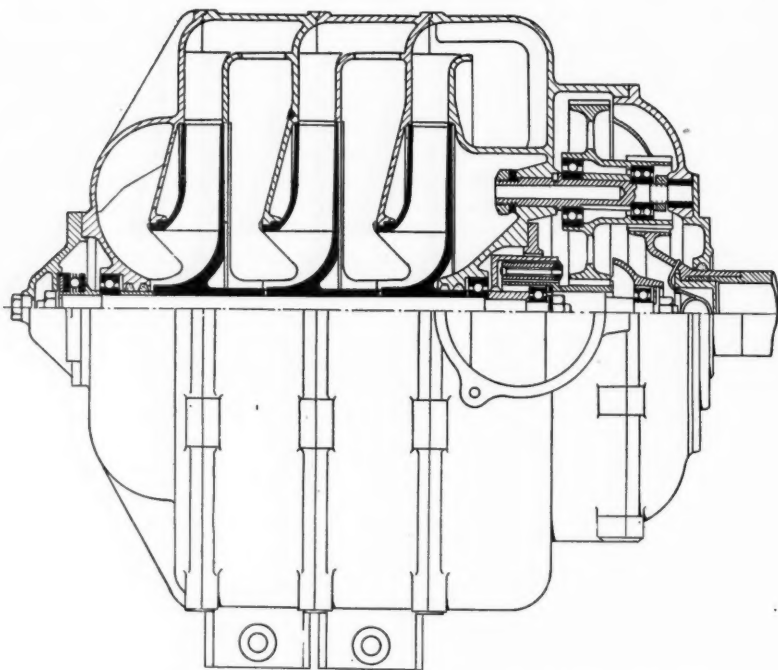
Where the supercharger is operated by a separate engine, the quantity and pressure of the air delivered by it can be regulated by throttling the engine and thus varying its speed of revolution. The supercharger pressure is measured by means of an open U tube which is filled with mercury, or by means of a vacuum gage. The level of the mercury or the position of the hand of the vacuum gage corresponding to different altitudes is engraved on a scale. Where automatic regulation is employed these instruments serve as a check.

Construction of Blowers

Blower superchargers consist of one set of stationary parts, including the case with its supporting members, the partition walls, diffusors, bearings, gear box, and inlet and



Schwade supercharger fitted to a 260-hp. engine



Part sectional view of Schwade multi-stage blower and drive

discharge connections; and one set of revolving parts, including the rotor wheels, the shaft, the gear wheels and the couplings.

The case is a thin-walled aluminum alloy casting, and the same applies to the inside fittings, if they are not made of steel and riveted. Either ball or roller bearings are employed. The rotors are made of alloy steel, and the vanes are riveted to them. Owing to the high speed of revolution, which amounts to 10,000-11,000 r.p.m. in the case of superchargers for single engines, and to 6000 r.p.m. in the case of central superchargers for multi-engined planes, the rotors must be very carefully balanced. Nickel steel is employed for the shaft. The gears are made of chrome nickel steel, hardened, and in some cases they are ground. The number of stages in which the air is compressed depends upon the pressure required. With the usual peripheral rotor speed of 450 to 500 ft. p.s. the superchargers require 3 stages to maintain the engine power up to an altitude of 11,500 ft., and 4 stages to maintain the power up to an altitude of 16,000 ft. The weight of a single 3 stage supercharger for a 260 hp. engine is about 105 lb., including the air connection to the carburetor and the driving coupling, and of a 4 stage supercharger about 132 lb. A four stage central supercharger for a 1200 hp. installation weighs alone 285 lb. or with a 125-130 hp. driving engine, piping and all accessories, between 1300 and 1400 lb.

Power Consumption of Blowers

The energy consumption of the supercharger depends upon the quantity of air required by the engine and upon the degree of compression, which in turn depends upon the altitude to which the output of the engine is to be maintained constant. The degree of compression required can be calculated from the mean barometer reading. The work of compressing one pound of air adiabatically is given by the following equation:

$$A_s = \frac{K}{K-1} R \Delta t \text{ ft.-lb.,}$$

where $K = 1.41$ and $R = 96$, while

$$\Delta t = \frac{\delta}{\delta_m}$$

which represents the increase in temperature due to the adiabatic compression. The latter depends upon the compression ratio V_o/V and may be calculated from the equation

$$\frac{\delta}{\delta_m} = \frac{461 + t}{461 + t_m} = \left(\frac{V_o}{V} \right)^{\frac{K-1}{K}}$$

The value t_m can also be obtained from tables and represent the mean temperature at the altitude in question in the course of a whole year. The above equation for the energy required does not take account of incidental losses, such as friction of the gears and at the bearings, and the formation of eddies in the diffusers, which increase the friction and vary with the compression ratio and the size and workmanship of the blower. The mean efficiency of compression may be assumed to be 65 per cent, and in specially favorable cases, 68 per cent. The power consumption of a 260-hp. engine supercharger designed for an altitude of 14,750 ft. works out as follows: At this altitude the mean barometric pressure is equal to 16.65 in. of mercury and $V_o/V = 1.8$. $A = 0.06$ hp. per engine horsepower. Therefore

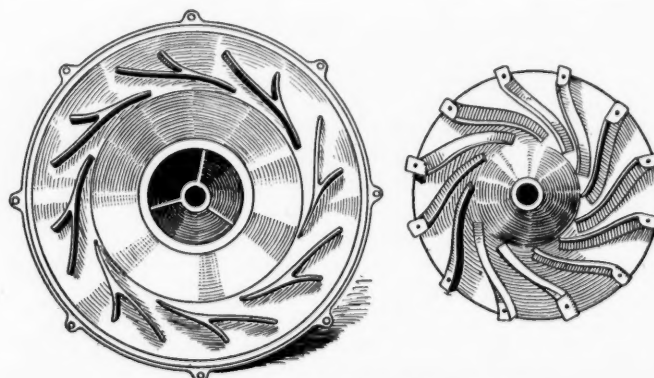
$$A_t = \frac{260 \times 0.06}{0.65} = 24 \text{ hp.}$$

As long as the pressure on the carburetor does not exceed one atmosphere, the engine output then will be 236 hp., which in most cases will suffice for "taking off." This output corresponds to be performance at 3000 ft. altitude without supercharger.

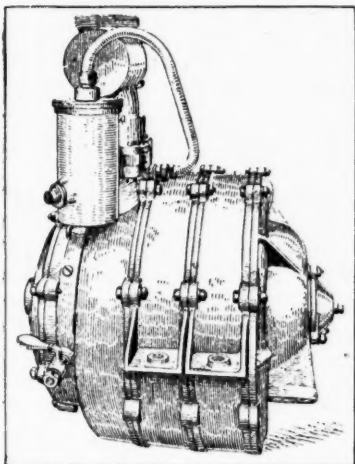
Schwade Supercharger

The first supercharger built by Otto Schwade & Co., Erfurt, was designed for direct connection to a 260 hp. Mercedes engine and for a mean air delivery of 22,000 lb. per hr. at a maximum pressure ratio of 1.52, corresponding to constant engine output up to an altitude of 11,500 ft. The Schwade blower consists of four adjacent chambers, the first of which encloses the gear drive and the three others contain each a rotor with the corresponding diffuser.

The chambers are all concentric and combined into a single block without horizontal joints. In assembling, a rotor and a housing are put in place alternately, and the housings are held together by means of screws on the circumference, while the rotor wheels are held on the shaft by means of a nut at the thrust bearing. The driving gear is of the back gear type, having two oppositely located intermediate pinions running on ball bearings on stationary studs. The rotors revolve at 10,500 r.p.m., the driving gear at 1400 r.p.m. and the intermediate gears at 3500 r.p.m.



Diffuser and rotor of Schwade blower



*Carburetor mounted on
Schwade blower*

With a rotor diameter of 10 in. the peripheral speed of the rotors amounts to about 460 ft. per second. The gear wheels are made of chrome nickel steel, hardened. The pinion on the blower shaft is built in one with a friction clutch consisting of four bronze sectors which are pressed against the inside of the clutch housing by means of centrifugal force. This clutch serves a double purpose, first, to facilitate starting of the engine, and, second, to protect the driving gear against violent shocks in starting, as the rotors are not connected to the engine until the latter has attained a speed of 600 r.p.m.

For lubrication the gear wheels are arranged to dip into the oil bath. In the illustration of the Schwade supercharger will be seen the carburetor and float chamber mounted on top of the blower, as well as the pressure equalizing pipe between the float chamber and the pressure side of the blower. The blower draws air from the bottom of the engine crankcase, and a throttle valve is inserted in the air inlet to the blower so that the pressure delivered by the latter can be regulated.

The complete supercharger with connections when first built weighed 105 lb., and as the weight of the 260 hp. Mercedes engine is 925 lb. and its output at 11,500 ft. altitude is only 170 hp., the weight per horsepower at that altitude, therefore, figures out to 5.44 lb. without the supercharger, whereas with the supercharger it amounts to only 4.37 lb.

This Schwade supercharger, in addition to being fitted to A. E. G. bombers, one of which established the previously mentioned post-war passenger altitude record, was also fitted to rotary engines. When mounted on rotaries, it takes its air directly from the atmosphere and forces it into the inlet pipe, which is fitted into the engine crankshaft.

The greatest amount of development work in connection with aircraft engine superchargers was done by the firm of Brown-Boveri & Co., in Mannheim, the parent plant of which in Switzerland had built turbo-compressors before the war. The first model of a supercharger produced by Brown-Boveri & Co. was for a 1200 hp. installation, and was driven by a 120-hp. Mercedes engine, which also received its air supply from the supercharger. This installation was used both in the D. F. W. centrally governed and the Staaken interplane "power egg" giants. Toward the end of the war the power of the giant

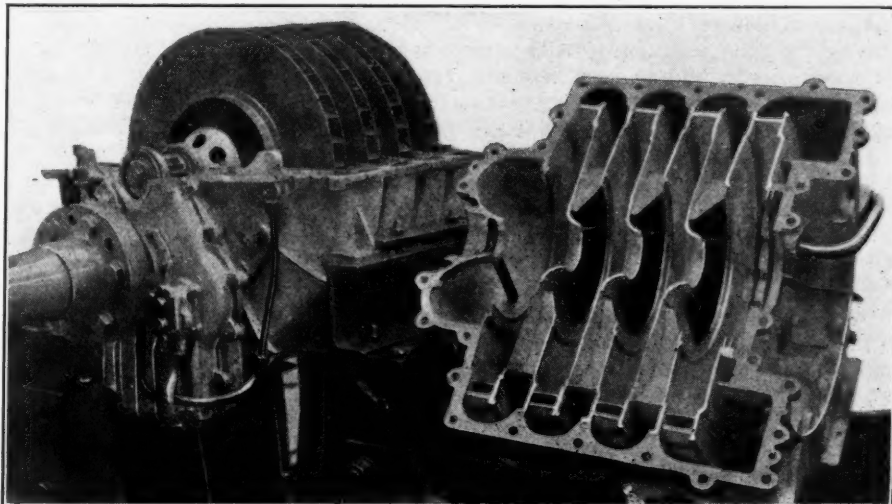
bombers was increased, and another Brown-Boveri & Co. supercharger of 1800 to 2000 hp. capacity, driven by a 160-hp. Mercedes engine, was nearly completed when the armistice was signed. Besides, a third design, with a vertical shaft, of the 1200 hp. supercharger was turned out for installation in the 1000 hp., 4 engined, single propeller drive Linke-Hofmann giant biplane with direct drive from the central gear, the case of which housed the transmission gear between the propeller shaft at 540 r.p.m., and the supercharger shaft at 6000 r.p.m.

In these superchargers installed in multiple engined aircraft, the float chamber of the carburetor is enclosed in a box, in which is maintained the same pressure as that delivered by the supercharger, so as to render the action of the carburetor independent of the outside pressure. On the suction side of the supercharger is fitted a hand controlled throttle device. In the Staaken giant biplane the air pipe to the engine driving the supercharger enters the box-like enclosure of the carburetor. The throttle valve is operated by means of a chain and sprocket control from the pilot's seat.

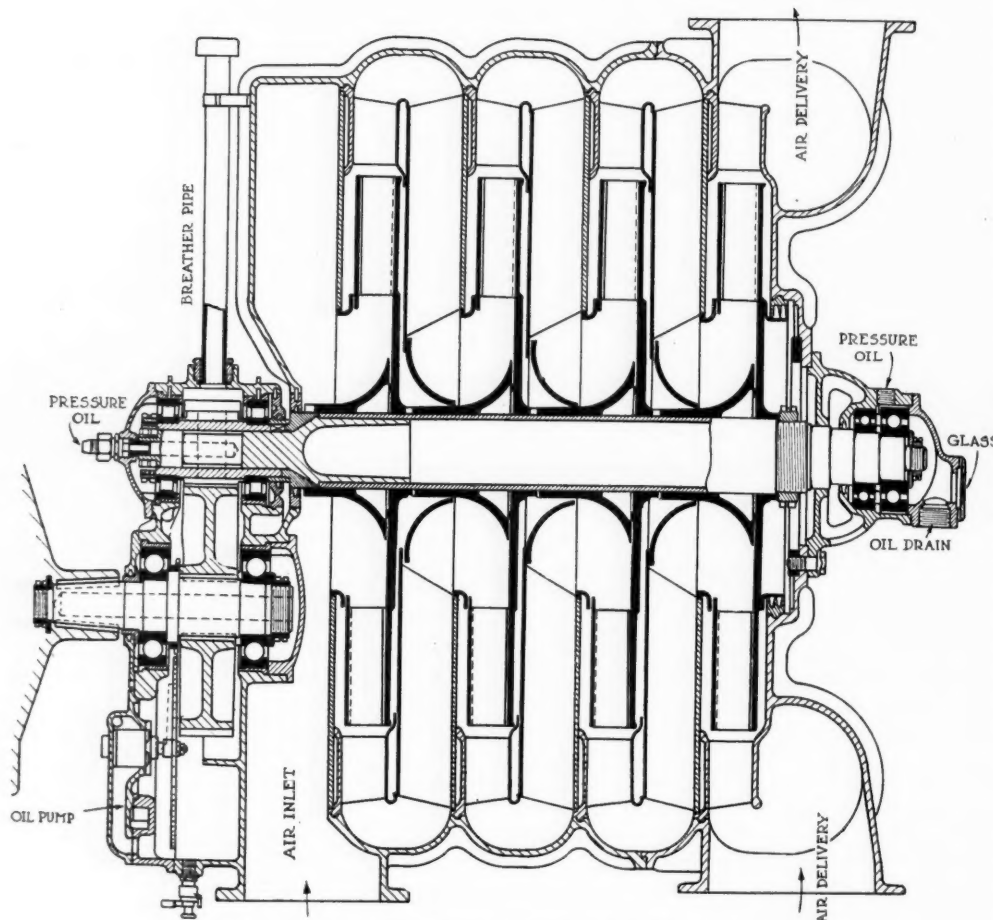
Later Brown-Boveri Designs

In later examples of the Brown-Boveri 1200 hp. supercharger the suction tube was removed to the gear side, so that the incoming stream of cold air would have a cooling effect on the gear. The air stream is divided in the final diffuser, and for the better guidance of the stream the outlets are connected by a practically tangential extension of the housing. The Brown-Boveri supercharger normally supplies 9200 lb. of air per hour at 0.52 atmosphere initial pressure and one atmosphere final pressure, the corresponding power consumption being from 120 to 125 hp. The speed of the driving engine is 1450 r.p.m., and that of the supercharger shaft 6000 r.p.m., the latter being geared up in the ratio 4.15 to 1.

This Brown-Boveri supercharger is of the 4-stage type and has rotors of 18.5 in. diameter, which gives a peripheral speed of about 490 ft. per second. The housing, driving gear, case, inlet pipe connection and diffuser vanes are cast of aluminum alloy. The rotors are made of a special alloy steel, having a tensile strength of 115,000 lb. per sq. in. and an elongation of 15 per cent. The ends of the hollow shafts are made chrome nickel steel, having a tensile strength of 108,000 lb. per sq. in. and an elongation of 16.5 per cent. The gears and pinions are of chrome nickel steel. Norma roller bearings are used on the shaft next to the pinion, which has to support very heavy loads. The gears were made by the Friedrichshafen Gear Works,



Brown, Boveri & Co. blower for a 1200-hp. installation



Latest design of Brown-Boveri blower for a 1200-hp. installation

which is a branch of the Zeppelin concern. The driving wheel has 54 teeth, and the pinion 13 teeth, with a circular pitch of 0.5 in. and a face width of 2 in. When transmitting 125 hp., the teeth are loaded to 1600 lb. per sq. in. They are hardened and ground on Maag machines. Oil is injected directly between the teeth through two nozzles of 0.08 in. diameter, being circulated by a gear pump driven from the small, slow speed shaft. The blower is connected to the engine crankshaft by a leather block joint. The complete supercharger with gear wheels weighs 320 lb. The coupling, with a disk flywheel mounted thereon, which has been found desirable in order to secure a smoother operation and to protect the driving gears against the shocks of the motor, weighs 44 lb.

Another blower, having a capacity of 2200 lb. per hr., with an initial pressure of 0.56 atmosphere, and a final pressure of one atmosphere, requires from 28 to 30 hp. and is designed for direct connection to a 260-300 hp. engine at 1600 r.p.m. Its rotor runs up to 10,000 r.p.m., and with a diameter of 11.4 in., has a peripheral speed of about 490 ft. per second. The materials of construction are the same as in the larger blowers. The driving wheels have 82 and 13 teeth of 0.315 in. circular pitch and 1 in. width of face.

A special design of spring coupling is employed to meet the objections of engine manufacturers against direct drive of the supercharger, helical springs being used. In tests made with scribes mounted on the circumference of the two disks, compressions of the springs were observed which indicated four times the normal driving torque. These spring couplings also form a universal joint, so that any oscillations of the supercharger as a whole relative to the engine are taken care of. Such oscillations are unavoidable, owing to the violent vibration of the engine

and the light wood frame of the airplane. The weight of the supercharger with gear is 120 lb., while the throttle arrangement weighs 10 lb. and the spring coupling weighs 13 lb.

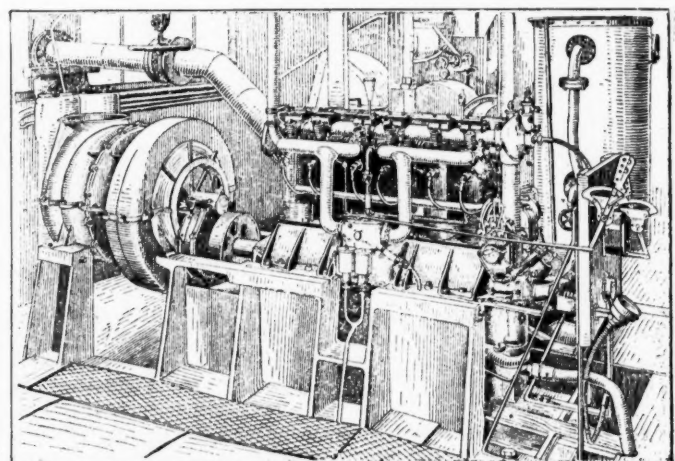
Brown, Boveri & Co. also produced superchargers for 350 hp. aircraft engines with a driving ratio of 1350:10,000 r.p.m. The delivery pipe from the blower was directed downward and connected to an air cooler of aluminum, which was to be inserted between blower and engine. Tests to determine whether the installation of this cooling apparatus resulted in an increase in engine output were not completed when the armistice put an end to the experiments. These tests were to determine whether the additional weight of 20 to 30 lb. and the additional air resistance due to the cooling apparatus were justified.

A. E. G. Supercharger

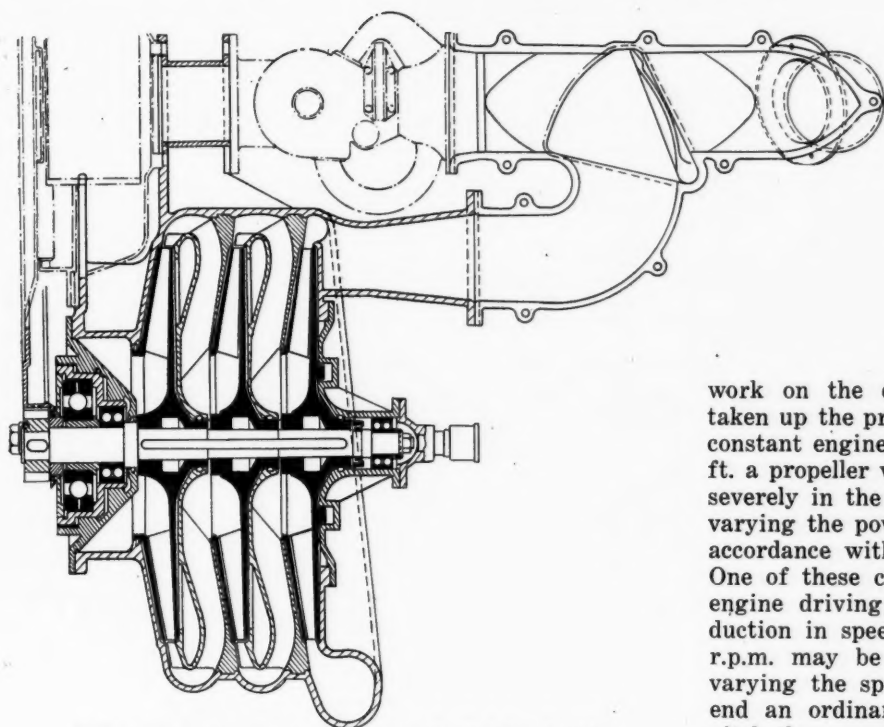
The A. E. G. supercharger, manufactured at the turbine works of the company at Hennigsdorf, weighs with its pipe connections and clutch 123 lb. and consumes about 10 per cent of the power output of 260-hp.

engine. With a supercharger of this type the output of the engine remains constant until an altitude of about 13,000 ft. is reached. The clutch itself weighs 20 lb. and the other parts required for mounting the supercharger the same.

The A. E. G. supercharger is driven through an automatic centrifugal clutch of which one member is mounted on the end of the engine crankshaft. This clutch engages only when the engine speed exceeds 600 r.p.m. The friction surfaces were originally lined with Ferodo fibre, but as this material was difficult to get in Germany, the clutch was converted into a centrifugal type with rocker arms. Between the clutch and the blower are inserted a pair of spur gears with a ratio of 1:6.9. This is followed



A. E. G. blower with separate motor for R-type giants



Three-stage blower for Siemens & Halske double rotary engine

by a small intermediate shaft with a square block type of universal joint, affording a certain amount of flexibility to take care of slight changes in the mounting and vibration in flight. At the same time this shaft forms a yielding member and a weak link for the protection of the shaft in case of sudden acceleration or obstruction within the blower.

The 3 rotor wheels operate at 10,000 r.p.m., and they consist of steel disks with vanes riveted on. The diffuser rings are made of aluminum. The cast aluminum case is divided in half horizontally. When fitted to the 260 hp. Mercedes engine, the usual inlet of the carburetor is replaced by a housing with automatic air valve and throttle valve. The air is again drawn in through the channel of the crankcase and flows through the automatically opening rotary valve directly into the carburetor, if the throttling device in front of the blower is closed. When this valve is opened, the automatic air inlet valve closes and the air then passes through the blower on its way to the engine. During ascents the throttle is controlled by means of a Bowden wire from the pilot's seat, but it can also be automatically controlled by means of an atmospheric diaphragm.

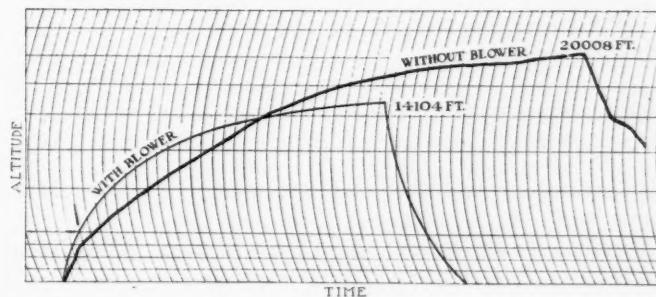
Siemens-Schuckert Single Engine Supercharger

The Siemens-Schuckert works also turned out a supercharger for the 260 hp. Mercedes engine, and another one for the Siemens & Halske rotary engine. Tests with the rotary engine-blower combination were made, but actual trials in flight were forestalled by the signing of the armistice. The main difference, as compared with the other models of superchargers described, lies in the fact that the spur wheel transmission gear is fitted at the propeller end of the crankshaft. The compressed air passes to the carburetor through a pressure pipe located outside the fuselage. Just ahead of the carburetor is located a change-over valve, which gives the pilot the choice between taking air from the atmosphere through the channel in the crankcase or compressed air from the blower. The latter is a two stage type and supplies an increase in pressure of 27 per cent at ground level when

running at 6900 r.p.m. or at a peripheral speed of 475 ft. per second. The other Siemens supercharger, for the Siemens double rotary engine, is a 3 stage blower and supplies an increase in pressure of 30 per cent at ground level when running at 8600 r.p.m. The power consumption is 11.5 hp. for 230 cu. ft. of air drawn in per minute. With its drive this supercharger weighs 62 lb.

Variable Pitch Propellers

Coincident with the beginning of work on the development of superchargers there was taken up the problem of variable pitch propellers, as with constant engine output up to altitudes of 12,000 to 13,000 ft. a propeller with constant pitch would be strained very severely in the higher altitudes. Two other methods for varying the power absorbing capacity of the propeller in accordance with the density of the air were also tried. One of these consists in the use of a variable gear, the engine driving two sets of bevel gears, whereby a reduction in speed from 1400 r.p.m. to 900 r.p.m. or 1000 r.p.m. may be effected. The other method consists in varying the speed of revolution of the engine. To this end an ordinary propeller is used, but with a greater pitch than usual. As the output of the propeller increases with the third power of its speed of revolution, but decreases only as the first power of the air density, at an altitude of 20,000 ft., at which the air density is only about one-half that at ground level, the speed of revolution of the propeller needs to be increased only in the ratio of $\sqrt[3]{2}$ equals 1.2599, or by about 26 per cent, if its power absorbing capacity is to remain the same as at ground level. This corresponds to an increase in engine speed from 1200 to 1500 r.p.m. By supplying air slightly above atmospheric pressure it is possible to overload the engine so that the plane can start off with the engine at 1300 instead of 1200 r.p.m. This means that a propeller designed for use at 10,000 ft. altitude is adapted for use on supercharging motors designed to give constant output

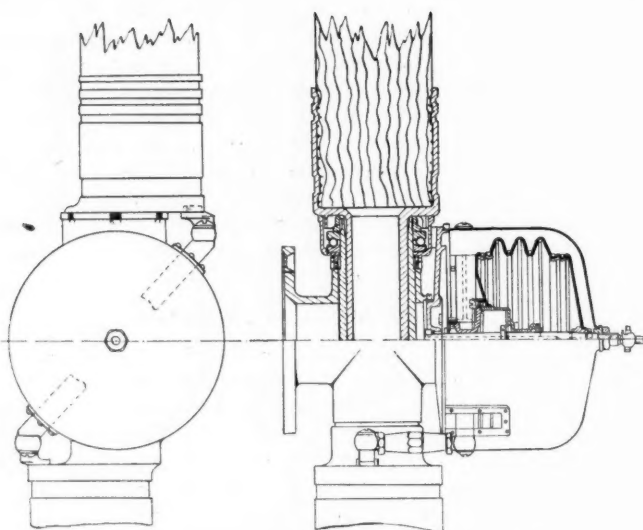


Barograph curves of an A. E. G. type G biplane with and without supercharger

up to an altitude of 16,000 ft. This, however, is a compromise which involves the disadvantage that within the increased engine speed range there is likely to be a critical speed of the engine at which the latter vibrates excessively and causes breakage of fuel, oil or water pipes.

Automatic Control

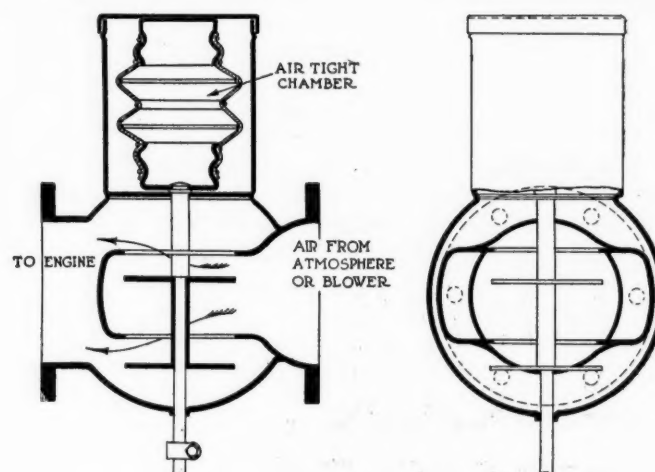
Of all the different variable pitch propellers so far tested in Germany, practical results have been obtained only with the one designed by Prof. Reissner, manufactured by the Helix Propeller Works in Berlin and at Hirth's Laboratories in Cannstadt. The Staaken-Benz



Lorenzen automatic variable pitch propeller

type of 4-engined giant, R-30, was equipped with the Reissner variable pitch propeller, the adjusting gear of which has been made in two different forms. Where hollow shafts are used, the pitch is varied by means of a sliding piece comprising a block which can be moved by hand through the intermediary of a threaded spindle. In the case of solid propeller shafts, use is made of a ring connected to the blades of the propeller by means of two links, the ring being operated by means of a bevel gear mechanism. During the latter part of the war the Reissner variable pitch propeller was also made with an automatic adjustment actuated by centrifugal force.

Various automatic devices for varying the pitch of the propeller have been suggested, generally based upon the barometer indications. The only serviceable one of these was made by the Lorenzen Propeller Works of Berlin. The main feature consists of a balanced dual valve which is



Lorenzen automatic air inlet valve for superchargers

controlled by a rubber membrane filled with air at a pressure corresponding to that at the required altitude. Where possible, the section of the blades is located in the center of pressure, so as to minimize the force necessary for the adjustment. Wabbling of the blade is prevented by oil cushions. The rubber bag is located in a chamber in front of the carburetor in which the pressure is kept constant. As the pressure inside and outside the bag is always the same, the walls of the bag are not strained in service.

The Garuda Propeller Works of Berlin also produced a variable pitch propeller which had the blades controlled by means of a centrifugal governor and an hydraulic servo-engine which maintained the speed of the propeller constant.

In conclusion, it may be pointed out that variable pitch propellers should be useful also in commercial flying, as they permit normal engine speed and therefore full engine output during ascents.

Constructive Industrial Study

MUCH publicity is usually given to the results achieved by any firm which has developed a successful industrial relations policy; that is, a policy which has enabled the particular firm to pass through times of unrest without labor trouble and which has increased production per man. Most articles dealing with such subjects deal almost entirely with results achieved and present only a few remarks about the methods used in attaining those results.

It is, however, only by an analysis of the methods used that the real value of the experiment can be brought out.

Other manufacturers, while perhaps admitting the results to a large extent, are prone to look upon such experiments as being unique cases; they are apt to believe that the same sort of results could not be achieved elsewhere. In many cases this suspicion contains much more than a grain of truth; very often the industrial relations policies most exploited in articles and publicity are not fundamentally sound and a careful investigation of the plant will reveal the fact that the material written has been at the best superficial and at the worst not quite true.

With these facts in mind, the investigator who would present to other manufacturers not merely stated results, but also an analysis of the methods by which those results were achieved, must go into the plant about which he is to write with a rather critical attitude of mind. From this viewpoint, an article should result which would explain to other manufacturers in detail the methods used,

how these methods were devised, how they grew up, how they are administered, what are the chief merits and what are the defects of the plan.

Any other approach to the investigation results merely in a publicity article which is of no value to the other manufacturer who is seeking for light on his own problems from a study of the experience of others. The investigator who is to present practical and valuable information must enter upon his investigation in any plant without assurance that he is certain to come away with a "story." His investigation may show defects that eliminate the possibility of writing a practical story of success; he cannot depend upon the executives of the firm to tell him the merits of the plan and its success; he must determine those things for himself after talking to the executives and making further investigations.

Any journalist can build up a good story upon a slight foundation; and the fact that perhaps he can sell the story and get paid for it is a powerful temptation to write it, even when false impressions and false ideas may be disseminated in that way. Constructive writing in connection with industrial relations has as much to do with refraining from writing a story at certain times as it has with writing one at other times. Only by careful analysis, thoughtful judgment, guarded praise and critical estimates can the best interests of human relationships in industry be served.

The Motor Truck as an Assistant to the Electric Railway

Motor trucks may aid electric railways in rebuilding their credit, according to George M. Graham. Mr. Graham presented motor truck possibilities to the recent convention of the American Electric Railway Association at Atlantic City. His suggestions were, in general, well received.

ATLANTIC CITY, Oct. 14.

THAT motor buses are one of the most effective means for rebuilding the vanished credit of the electric railways of the United States was a statement made by George M. Graham, Vice-President of the Pierce-Arrow Motor Co., Buffalo, N. Y., in his speech, "The Motor Vehicle—Competitor or Ally," presented before the thirty-ninth annual convention of the American Electric Railway Association here to-day.

Mr. Graham, as a member of the automotive industry, made two other recommendations to the electric railway interests. These were to leave the carrying of freight to the steam railway and the motor truck, and to eliminate unfair bus competition by installing buses themselves.

On the whole, Mr. Graham's speech was well received and he was heartily applauded for his statement that the motor bus cannot possibly eliminate the electric railway. He pointed out that the motor bus undeniably has a certain field in passenger transportation and that similarly, the electric railway has its field. The public will be best served when each means of transportation is employed where best adapted.

Comments heard among the 200 railway men present at the meeting after Mr. Graham had concluded his address showed that the consensus of opinion seemed to be that the electric railway industry was so close to its own problems that it needed vision from an outsider as to how the motor bus could be employed to the best advantage in connection with city passenger transportation. Mr. Graham's statement that "it makes no difference whether the power that mints the coin comes from the leap of the electric current or the explosion of the internal combustion motor" was well received and applauded.

There was no discussion whatever upon the floor after Mr. Graham's speech, so that just what action may be taken by the individual railways on the recommendations made by Mr. Graham remains for the future to determine. Many of the audience winced at Mr. Graham's statement that the average electric railway does not understand its customers and that this lack of psychological study of the customer on the part of the electric railway has been responsible in great part for the present unresponsive if not actually antagonistic attitude of the public toward electric railways generally. Mr. Graham said that if he were an electric railway executive, the first thing he would do after he got home from the convention would be to install a "good will" line of buses and eliminate bus competition in that manner. He would operate these buses exclusively for the purpose of helping to regain the public's good will and would run the

vehicles during the rush or peak load periods in the morning and evening. This suggestion was received in silence, although one railway executive after the meeting was heard to remark that if open discussion had been considered appropriate on the address of an invited speaker outside of the industry, there might have been heated arguments as to the feasibility of the plan proposed.

The undercurrent of feeling at the meeting seemed to indicate that the field of the bus was assured so far as its employment to extend present lines further out into the suburbs was concerned. The mention of the fact that the Broadway Association in New York had started a campaign to remove the street car tracks on Broadway and install buses in place of the street cars did not seem to have many adherents. The idea seems to be to leave the present trolley lines in operation and employ the motor bus merely as a means of extending service beyond the ends of existing lines. The practicability of "good will" bus lines to supplement trolley service on routes where the trolleys cannot give good service during the rush periods is still a debatable proposition.

Other papers on the bus situation were presented by R. Gilman Smith of the Milwaukee Electric Railway & Light Co., Milwaukee, Wis., who spoke on "The Place of the Motor Bus as a Supplement to Electric Railways" and by the secretary, who read a paper on "The Place of the Motor Bus," by Frank C. Pick, Commercial Manager, London Electric Railway Co., London, England. Both of these papers contained more or less incomplete figures which purported to show that on the cost per passenger moved, the electric trolley was far cheaper than the motor bus, even though the cost per mile operated of the two means of transportation were more nearly equal. These figures merely show to the analyst the correctness of Mr. Graham's statement that there is a field for both the electric railway and the motor bus. The field of the motor bus becomes more and more limited as the length of the run is increased.

Both the papers presented by Messrs. Smith and Pick, electric railway men, acknowledged a field for the motor bus in the extension of new lines where it was shown the capital investment required in plant and new trackage would be so far in excess of the cost of the bus installation that the buses would prove more economical.

IN Canada, refined tar has gradually taken the place of crude tar, it having been found that pavements built using the unrefined product are uneven in their wearing qualities on account of the variations in the quality and density of the tar used.

Present Status of Isolated Gas-Electric Generating Plant

The farm lighting industry has increased greatly during recent years, and 175,000 plants are now in actual use. Metropolitan Section of S. A. E. hears paper which describes the historical development and present status. Relative advantages of automatic and non-automatic plants discussed.

AT the monthly meeting of the Metropolitan Section held at the A. C. A. on the 14th inst., the first paper on isolated lighting and power plants ever presented to the S. A. E. was read, the author being Charles Froesch of the S. W. Merritt Co. In introducing the speaker of the evening, Chairman A. M. Wolf of the Metropolitan Section dilated on the growth of the farm lighting plant business. Three years ago, he said, there were 17 different sets on the market, while to-day there are no less than 74. It is estimated that there are a total of 175,000 plants in actual use. The largest company in the field now has a production of 100 sets a day and several others produce about 30 a day.

Mr. Froesch, in his paper, briefly sketched the historical development of the farm lighting sets. He said that even the early plants, which generally consisted of crudely built belted units, gave so much more satisfactory service than kerosene and acetylene lighting that the demand constantly grew. He also outlined the possible field for farm lighting sets, showing by means of Department of Agriculture statistics that there are more than 3,000,000 farmers in this country who may be expected to buy a plant sooner or later. In addition there are the big fields for marine sets and sets for schools, churches, camps and moving picture theaters, aside from the export field, which is a very important one and is growing fast.

Mr. Froesch figured that the average farmer would require about 880 watt-hours a day for lighting. There are, however, many other uses to which electric current can be put on the farm, and later on, in reply to a question, he stated that the best size of unit for the average farm was one of 2½ kw. Brief illustrated descriptions were given of the principal systems now on the market, including the Merritt plant designed by the author of the paper.

In conclusion Mr. Froesch discussed the design of the various components of a lighting set. After the reading of the paper and before the discussion was started, a demonstration of the Merritt plant was given before the audience. This plant was described in AUTOMOTIVE INDUSTRIES some months ago, and it is, therefore, unnecessary to go into the detail of its construction here. During the demonstration it was operated alternately on gasoline and kerosene, and it seemed to work equally well on both. Mr. Froesch stated that the fuel consumption was substantially the same, irrespective of the kind of fuel used.

In the discussion it was urged that dealers for farm lighting sets should be induced to take on a full line of accessories, as an isolated electric generating plant is taken advantage of to the full only if current is used for power and for various domestic purposes as well as

for lighting. As regards export business, it has been noted that foreign customers usually ask for magneto ignition, which may be due to the fact that they are prejudiced against battery ignition. However, the view was expressed that the large number of American passenger cars which are now being exported and which use battery ignition successfully, would probably cure them of this prejudice. In connection with the demonstration, there was shown a wide array of electrical accessories which can be operated with current from small generating sets, and Mr. Froesch gave the power consumption of the individual devices. An electric sad iron, for instance, consumes 600 watts. Referring to this statement, one of the members asked whether the ¾ kw. plant was not too small if an iron alone used 600 watts. The reply was to the effect that the chief reason for the present popularity of the small plant was that it was most efficient for small loads. The small plant has been sold in the largest numbers so far, but it has been observed that farmers in buying their second outfit usually buy a larger one, never a smaller one.

Reference was made in the discussion to some plants recently put on the market, which operate without any battery carrying the load, the only battery being a small one for starting the engine. This, of course, has the advantage of cutting down the first cost, which, however, is largely balanced by the disadvantage that the plant must be kept operating as long as a single light is burning. Another disadvantage of such a system is that there must be a return circuit from each lamp to the generator in order that the turning on of that lamp may start the plant operating. It was claimed that the extra amount of copper thus needed would practically buy a storage battery. Other objections raised against the plant without load-carrying battery were that sometimes it was very desirable to have light without having the plant running, as for instance, in reading late at night, and that the engine might not always start when a lamp was turned on. It was stated that so far only two such plants had been placed on the market.

A representative of the Sangamo Co. (which makes the ampere-hour meters used on nearly all automatic plants) was asked whether it was true that his concern was working on a control device based on the battery voltage, but he would not commit himself. In reply to a question as to the closeness of voltage control, Mr. Froesch said that the voltage range of the plant being demonstrated was from 32-38 volts (full load to no load).

For export business magneto ignition was advocated, for the reason that when the storage batteries are shipped to foreign countries, they are practically dead upon arrival, and it is then a rather difficult matter to start the engine on battery ignition. However, by con-

necting the coil temporarily across the entire battery, sufficient current can usually be obtained to produce an effective ignition spark. A year or so ago it was proposed to ship the battery plates dry in a fully charged condition, so that upon assembly and the addition of electrolyte, the battery would be in condition to supply current. It was found, however, that the plates would buckle as soon as they were immersed into the electrolyte.

A good deal of the discussion centered around the relative advantages of automatic and non-automatic plants. On the one hand the advantages of an automatic plant were admitted, but it was held that a thoroughly reliable automatic plant had not yet been developed. On the other hand, it was claimed that too much automaticity might be a disadvantage, in that it would keep the owner from ever going near his plant, which would consequently be neglected. One speaker claimed that the non-automatic plant was the safest to put into the hands of the average owner. It was true that with such a plant the battery would occasionally be overcharged, which was a detriment. One factor that tends to protect the battery in such a case was the limited fuel supply. When the fuel supply was exhausted, the plant would automatically shut down and it was figured that the battery could not be seriously damaged by overcharging while the fuel supply lasted.

There was also some discussion on the principle of action of the ampere-hour meter used in most automatic systems. It was brought out that the mechanism of the ampere-hour meter runs faster on reverse current than on charging current, which makes up for the loss in the battery. In addition, the meter is provided with a compensator, which can be adjusted to allow for various de-

grees of overcharging, as may be found desirable. Users of such plants, moreover, are generally instructed to reset their ampere-hour meter once a month, by fully charging the battery and then setting the meter to the fully charged position.

Some figures were given regarding the fuel cost per kilowatt-hour. For instance, with gasoline at 35 cents per gal., the fuel cost figures out to about 13 cents per kw-hr., whereas with kerosene, the cost comes considerably lower. One speaker regretted that there was no more natural gas in the United States, as this was a very suitable fuel for the average isolated lighting plant and cost only about 1 cent per kw-hr.

Another speaker referred to the seriousness of the service problem and stated that the manufacturers of the plants should agree on some standard method of rendering service. He had recently returned from a trip through a section of Maine, where he had found that many farmers in Aroostock County had given up their plants because they had been unable to get service and could not keep them in repair themselves. Owing to the fact that many of these plants go into remote places, the service problem is a very difficult one.

A representative of the manufacturers of the Genco set said that one difficulty in the farm light field was that at present generally too small a plant was sold for the purpose, that a customer was assured it would do all the work he asked of it and that it was guaranteed for a year. Now, no manufacturer could afford to sell a complete plant for \$550 and to guarantee the purchaser the services of an engineer for one year to keep it running. As regards the life of these sets, the statement was made that some units had been run for 17,000 to 20,000 hr., and still gave satisfactory service.

Thermostatic Metal

A NEW thermostatic metal has been developed by the H. A. Wilson Co. and is being placed on the market under the trade name "Wilco." It consists of a bi-metallic sheet or strip, made by permanently welding throughout their entire length, two strips of metal having widely different co-efficients of expansion. One of these is Invar steel, having a co-efficient of expansion of 4×10^{-7} per deg. F., and the other is a special brass, having a co-efficient of expansion of 9.18×10^{-6} , or approximately 25 times as great as that of the inert metal. When this bonded combination is subjected to a change in temperature, the differential expansion which occurs along the entire length, causes a definite and regular distortion approximating an arc of a circle. When the strip is returned to normal temperature, the metal returns to its original shape, that is, it becomes straight again. It is claimed that Wilco thermostatic metal can be carried through this cycle an indefinite number of times, this constancy of operation being the result of a special process of welding the two components together. By the use of this metal, thermostats for the control of room temperature, or for chemical drying ovens, can be made to control within 2 deg. F.

Thermostatic metal is subject to certain abuses which must be guarded against. Thus the metal near the joints of the two components may be stressed beyond the elastic limit, either by subjecting the whole strip to an excessive temperature, or by bending it mechanically. The resulting internal stresses tend to relieve themselves by slowly distorting the metal while kept at a constant temperature. This equalization of the stresses will always destroy the

calibration of any device in the construction of which the metal is used.

Wilco thermostatic metal can be used with any temperature up to 500 deg. Fahr., if it does not have to perform any mechanical work during its motion. If the metal must overcome resistance, as, for example, the lifting of a dead weight, the upper temperature limit is correspondingly lower.

It is often necessary to form the thermostatic metal into certain shapes other than straight pieces. In that case, while it is being bent or transformed in shape, certain strains are being set up which must be removed before the metal can be used as a permanent fixture, as otherwise the calibration of the instrument of which it forms a part will be destroyed, the metal slowly changing its shape and creeping back to its original position. These internal strains can be removed by a heat-treatment, consisting in aging the metal in an oven or heating it to 212 deg. F. in a steam bath for 24 hr. For ordinary purposes this aging is sufficient. If further aging is found necessary, the following practice will give good results: Heat the metal for 12 hr. in an oven at 212 deg. F.; remove and allow it to remain at room temperature for 12 hr. Repeat this for two days.

While thermostatic metal will perform a certain amount of useful work directly, it is generally found preferable to make it act as a relay or check mechanism to regulate some other more powerful source of energy capable of performing the necessary work. The operation of auxiliary needles and piston valves, as well as solenoid relay circuits, is readily accomplished by its means.

A Labor Policy Worth Serious Analysis

The labor policy described revolves around clear-cut fundamental factors. It does not involve industrial democracy nor is it a "ready-remedy for industrial ills," but has been developed chiefly by clear thinking and hard work. It is worth the careful study necessary to analyze it thoroughly.

By Norman G. Shidle

LABOR turnover is used frequently as a yardstick to measure the success of a labor policy. Measured by this standard, one or two firms in various cities stand out from the others and cause widespread comment and discussion. As far as shedding light upon the betterment of industrial relationships in general, the labor policy of a firm so marked may be of far less importance than the amount of discussion concerning it would indicate. Its real significance can be determined only by a complete analysis of the methods used as well as of the results claimed. Results may be merely claims of the management; methods, if investigated, bring out the really important facts—facts of value to other manufacturers in seeking a solution of their own problems.

On the other hand, a low labor turnover usually does indicate the application of effective methods of handling industrial relations. Measured by this standard, the White Motor Company has achieved results superior to other firms in the city in which it is located. And an analysis of its methods, policies, and conduct of human relationships indicates that its excellent results have been achieved through the application of sound principles, the examination of which will be of value. The results obtained prove the value of the methods, but only a careful analysis of a number of factors can aid another manufacturer in applying similar methods in his own plant. Such an analysis is attempted in this article.

The various factors must be considered as a unit after each one has been studied separately.

Constant Effort Necessary

There is no magic about what has been done in this plant. Constant effort has been necessary and probably will always be necessary to achieve the purpose. Utopia has not been found, nor has every kink in the problem of human relationships been ironed out. Definite results have been achieved, however, by the intelligent application of sound economic, psychological and philosophical principles. Though in working out these principles in practice, it is doubtful if the executives thought of them in these high sounding academic terms.

While it is perhaps more logical to tell first of methods and finally of results, it seems best to reverse the order in this case. The results are so excellent as to convince one that it is worth while to examine the methods used to produce them.

During the last five years the average labor turnover at this factory has been about 61 per cent. The highest percentage for a single year was 82 per cent in 1916, and the lowest 25 per cent in 1919. The average turnover of other Cleveland plants has been close to 200 per cent during this period. In addition to this, at the White plant the number of trucks produced per man has in-

creased appreciably during the last five years when most manufacturers were especially troubled with inefficient labor.

The following table, which is almost self-explanatory, presents in concise form the salient features of the results. A study of it will show more clearly than the reading of many words just what has been accomplished.

Year	Factory Value of Product	Average No. Men	Estimate Buying Power of \$1.00	Average Weekly Earnings Based on 51 Weeks Work	Hours' Work	Hours' Pay	Total Wages	Trucks Per Man Per Year	Factory Value of Trucks Produced Per Man Per Year*
1910	\$3,836,290	1,072	.....	\$14.04	60	60	\$767,496	2,290	\$3,578.63
1911	5,097,523	1,419	.....	12.82	59	60½	927,696	1,985	3,592.33
1912	6,739,756	1,852	.....	13.53	59	61½	1,278,426	1,785	3,639.17
1913	6,795,196	1,964	.....	13.45	59	61½	1,347,064	1,785	3,459.87
1914	9,023,172	2,202	\$1.00	15.03	59	61½	1,688,467	1,924	4,097.72
1915	21,040,078	3,758	.90	16.51	54½	59½	3,163,857	2,460	5,598.72
1916	17,053,311	3,611	.86	17.34	54½	59½	3,186,921	2,082	4,722.60
1917	22,448,927	4,341	.72	20.94	54½	59½	4,637,105	2,040	5,171.33
1918	30,952,748	4,844	.55	27.07	54½	59½	6,688,051	2,720	6,389.91
1919	35,525,477	5,468	.50	31.73	49½	52	8,849,322	2,766	6,496.98

The factory value of the trucks produced includes: Merchandise and supplies, power and fuel, maintenance and repair, factory salaries and general administrative expense, insurance, Federal, state and city taxes, plant extension, etc., and dividends. Referring to the figures for 1919, when the average trucks per man was 2.766 and the total value \$6,496.98, the company states that the average value of each of these trucks was \$2,347.

It will be noted from this table that even though wages were steadily increased as the buying power of the dollar decreased, the actual value of the trucks produced per man has risen steadily. This has been due to increased efficiency of workmanship, not to increase in truck prices, since the price of the truck has increased only 10 per cent since 1914. Thus a condition is shown which indicates increased returns for the management, increased returns for the workmen, a reasonable price to the buyer, and satisfaction all the way round. Certainly these are desirable results for any manufacturing plant to achieve. Can any one do it? To what factors can the success in this plant be attributed?

Methods Described in Detail

As stated before, this can be determined only by a careful study, since the policy has been and continues to be accomplished by constant work and adaptation. There is no scheme or plan or "industrial cure-all" involved. This fact makes the policy more difficult of description, but far more worth describing.

Perhaps the factor of primary importance is the constant development of an intelligent, effective, and mu-

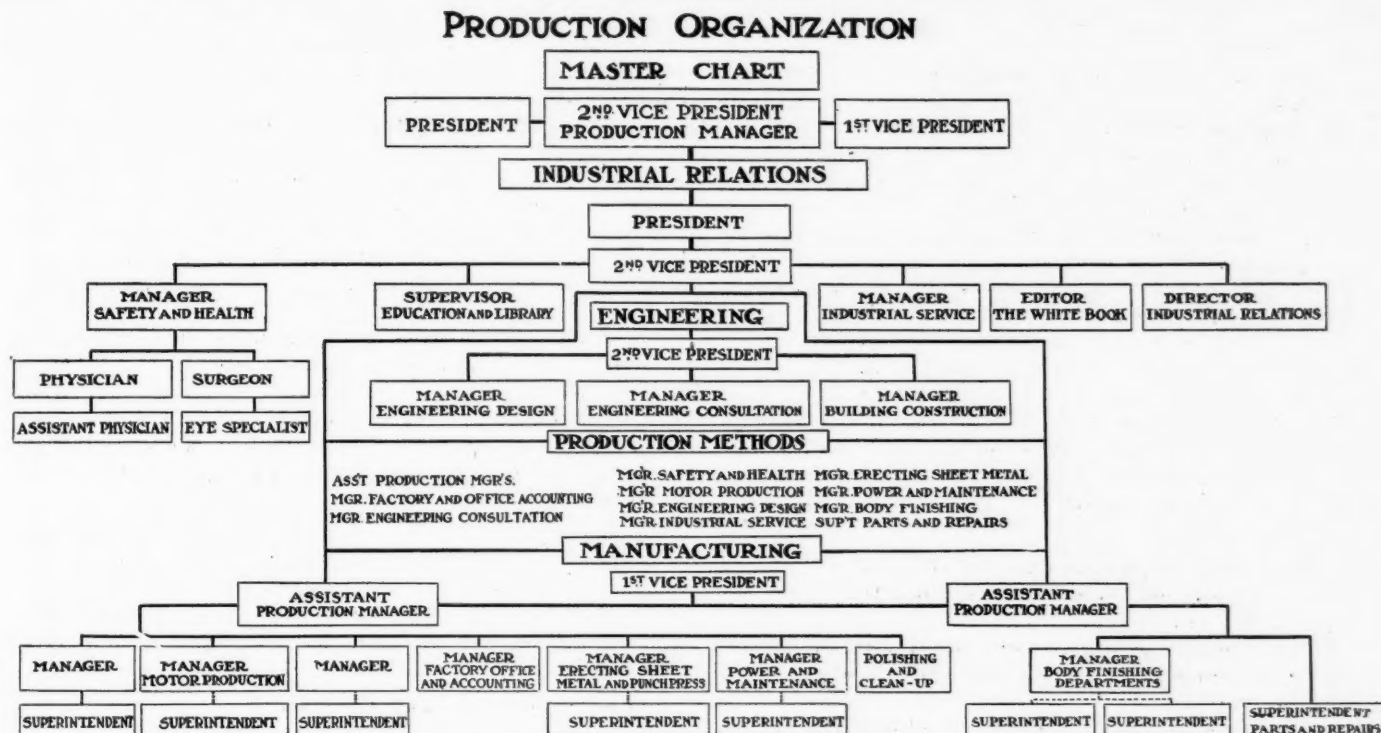


Fig. 1. Organization chart showing importance given to industrial relations

tually beneficial campaign of education directed on the part of the management to the employees. The information imparted to the employees through this campaign is not at all similar to that usually presented under the guise of education. The chief purpose of true education is to teach a man **how** to think for himself; that which attempts to teach him chiefly **what** to think is propaganda. The work at this factory fulfills the former function more satisfactorily than that of most other automotive plants; it is based upon the idea that the point of view of the management is fundamentally correct and that the majority of men will come to that point of view eventually if given full freedom of thought and action, together with accurate facts.

Whatever facts affect the workman in any way—and practically everything does affect him—are presented by the company frankly and openly. It states facts and figures accurately and in detail—and usually without attached comment attempting to tell the workmen what they should think about those facts.

The table of production figures shown above was presented first to the workmen. As time passes and additional figures are compiled to bring this table up to date, the new returns are brought to the attention of the workmen, chiefly through the medium of bulletin boards. This table, for example, was prepared in blue print form on a sheet large enough to be read at some distance; it was then placed on the various shop bulletin boards. The same practice is followed with other tables of information which the company wishes to present to its employees.

Following is another set of figures presented to the workmen. It shows the men two things: (1) That their efficiency has increased the ratio of the product to the plant value very considerably. (2) That the ratio of the wages to the product has increased materially at the same time. The chart is presented in simple form so that almost anyone can understand it. By mere weight of bare facts it answers some of the first questions that arise in the mind of the workman as he sees his company growing, its plant getting larger, and imagines its profits

to be increasing very greatly. The prompt and frank presentation of such a chart as this stops entirely those unfounded and always exaggerated rumors which detract so much from the efficiency of nearly every factory.

COMPARATIVE FIGURES	1914	1918	1919
Production value.....	\$9,023,172	\$30,952,748	\$35,356,000
Plant value.....	1,879,000	3,200,000	3,650,000
Ratio, Product-Plant.....	4.8 to 1	9.7 to 1	9.6 to 1
Total Product (parts included).....	4,255	13,163	15,064
Average number of men.....	2,202	4,844	5,475
Average weekly earnings.....	\$15.03	\$27.07	\$31.64
Total wages (Factory employees).....	\$1,688,467	\$6,688,051	\$8,835,000
Ratio, Wages-Product.....	13.81%	15.84%	18.35%
Direct.....	4.90%	5.81%	6.63%
Indirect.....	8.91%	10.03%	11.72%
Total.....	18.71%	21.65%	24.99%

The management here presents all the facts to the workmen; it lets them in on all the essential developments. At the same time it does not dictate to them what they should think. It merely presents these facts that the discussion of such matters among their employees may be carried on upon a basis of fact instead of rumor and conjecture.

Out in the shop appears, as well, an organization chart, the essential features of which are presented in Fig. 1. This chart not only acquaints the employees with the personnel of the managing forces, but it also indicates to them the importance with which the management views industrial relations. Industrial relations, it will be noted, is placed at the head of the chief divisions of the organization, "as without proper industrial relations, maximum production cannot be attained." The president of the White Motor Company as well as the second vice-president, in charge of production, meets with the industrial relations group.

The way in which the employees' service or "welfare work" is conducted and presented to the employees is worth special notice. A detailed expense sheet is prepared and placed before them, showing the expenditures from the "Special Fund." This fund is "set aside from production for the conduct of such activities as seem

necessary." The expenditures are divided into three parts, as follows:

1. Expenses necessary to comply with compensation law.
2. Expenses which are a direct saving to employees.
 - a. These include loss on factory kitchen, money paid employees for time lost on jury duty, benefit society donations.
3. Expenses which render special service to employees.
 - a. This includes choral society, baseball team, band, orchestra, education and library, information bureau and industrial service.

In 1919, for instance, the figures showed that the average cost of the first service per man was \$.033 per day, for the second, \$.045 per day, and for the third, \$.035 per day. Since it is not the purpose of the company to conduct any of these activities in order to make more money on the men in some other way, the entire facts were presented.

The company pointed out that the expenses under group 1 could not be eliminated since they were required by law.

Those under group 2 were not really donations from the company, since the workmen paid for them in the long run.

Those under group 3 could be eliminated if the workmen so desired.

Their elimination perhaps would give each man 11 cents per day more in his pay envelope. It was pointed out, however, that this would not necessarily be true, because it was the belief of the company that these activities enabled the men to work more effectively and that production might suffer from their elimination to the extent of more than 11 cents per day per man.

The proposition was left up to the employees, however, and they agreed with the company's attitude. Thus any suspicion of what the company was doing in regard to "welfare work" was eliminated simply by two things:

- (1) the facts were presented frankly;
- (2) those facts were in accord with what was fair and self-respecting for the workmen.

Among the most significant tables presented to the men in this educational and informational campaign is one which tells them frankly and accurately how the money of the concern is spent, what proportion is paid out in wages, and what proportion goes to the other factors of the manufacturing process. The exact figures cannot be quoted here, but they were quoted to the workmen. The expenditures were classified under these seven headings:

1. Taxes.
2. Reserve for Contingencies.
3. Maintenance of Plant.
4. Expansion of Plant.
5. Wages and Salaries.
6. Dividends.
7. Materials.

The necessity for the various expenditures was explained and later discussed with individual workmen who were inclined to dispute some of the statements.

These few examples serve to illustrate the way in which the management takes the workers into its confidence. It should be noted that this sort of thing is being done continually in this plant. The management has not expected to set forth certain ideas, "sell" them to the workers, and then go about attending to its other busi-

ness without further reference to industrial relationships. As conditions change, change takes place in the organization, its plans, policies, and business. All these changes are presented to the workmen, so that they constantly feel that they are "in" on everything that is going on.

Many plants, for instance, have recently laid off large numbers of men. The employees of the White Company knew this, of course, and a rumor started that men were quietly being let out in large numbers from their own factory. This caused considerable comment and discussion.

Rumors grew more extravagant with each repeating. As an antidote to these rumors, signs were posted throughout the factory showing the exact number of men employed during every month of this year. These figures showed that 75 more men were employed during August than during September and thus the false rumors were set at rest.

At the same time it was explained to the men that the factory would run at its usual capacity as long as possible, and that if any reductions were to be made they would be duly notified by the management; that facts would be presented to them as soon as any new ones developed.

Freedom of Thought and Discussion

Growing naturally out of an educational campaign of this kind is the policy of free thought and free discussion on every question relating to industrial relations, social conditions, or economic problems. In every way possible the men are encouraged to think for themselves. They are encouraged to read books of all kinds, to understand radical as well as conservative thought and theories, and to discuss these things with the management as well as among themselves.

This policy is actually carried out in practice and is not a mere statement of a theoretical nature. A recent occurrence illustrates this point rather strikingly.

A certain radical organization recently held a series of meetings in Cleveland for the purpose of gaining new members and spreading propaganda for its cause. During this convention the police learned that meetings were to be held at various factories throughout the town, and that the White Motor Company had been singled out for special attention. Consequently they telephoned to the director of industrial relations at the White factory, told him of their information and stated that they would send out enough men to break up the meetings should they be held.

The director of industrial relations took the matter up with a higher executive of the company. Following is an excerpt from the memorandum which the director of industrial relations wrote and which was heartily approved by the higher official:

"Was greatly surprised to learn that although this organization is taking from the bona fide organization large numbers of members, still the A. F. L. organizations are making no noticeable effort against them. On the contrary, they have more or less respect and admiration for this organization, admitting rather reluctantly that it is more constructive and more progressive than their own.

"It has been rumored that during this convention the above mentioned group, which is considered very radical, intends to stage many factory meetings intending to train their guns on the White Motor Co. The police have been instructed to watch for such meetings, and they, the police, informed the writer that there was to be a meeting at the White Motor either Monday, Sept. 13th, or Tuesday, Sept. 14th. The police department also stated they had received orders from the Thirteenth Precinct to arrest the speakers and disperse all such meetings.

"In the opinion of the writer, such action on the part of the police would be a great mistake, as it is not the policy or the desire of the White Motor, if I understand the policy correctly, to in any way interfere with such a meeting.

"There is absolutely nothing to fear from any man, whether he be radical or otherwise, in the White Motor Co. factory, and it can be almost as safely said that there is at no time anything to fear from men working under reasonable conditions. The best way of killing the radical is to allow him to kill himself, giving him all leeway possible, then when he is through talking he is through forever. A thinking workman is interested in what he says, but will do his own thinking when the radical is through talking."

Another sample of the practical application of this encouragement of active thinking in a broad way appears in a recent library announcement in the company house organ. The library, provided for the employees from the "Special Fund," announces among late books received for circulation among employees such volumes as the following: "What the Workers Want," by Gleason; "The Great Steel Strike," by Foster; "Industry, Emotion and Unrest," by Thomas; "The New Unionism," by Budish and Soule; "The Human Factor in Industry," by Frankel and Fleischer, and "Social Theory," by Cole. It is worth considering the psychological effect of the presence of such titles in a company library even though most of the workmen never penetrated farther than the covers of some of them.

This encouragement of real thinking on the part of the workman is directly in line with the educational policy just described. Both of these things, however, might be expected to have one almost certain result. Many questions would be suggested to the minds of the workers about which they might otherwise have known nothing, new doubts as to the justice of the company's policies might be instilled into them, new discussion might spring up and new questions might be asked for which the management would have to find satisfactory answers or face added unrest. Just these things have happened in the White plant.

A necessary corollary of this broad-minded policy as regards education and free thought, is the readiness of the management to discuss fully, frankly and thoroughly with any workman or group of workmen every question which may arise. The presentation of every one of the tables previously described has caused a number of objections, queries and arguments to be brought to the management from among the workmen. It has then been necessary for the management to argue the matter out with the men, explain any points which are not clear, and justify its position on economic, moral and business grounds.

Such procedure requires a great amount of time, much patience and constant study and work. It is the general opinion among manufacturers that such discussions are futile, take up more time than they are worth and hamper the proper discipline and administration of the factory. The White company disagrees on this point, and the results it has achieved by its methods are such as to leave but little doubt of their superiority. It is well to recognize, however, that it would be suicide for any firm to adopt the White policy without being ready to assume the responsibilities of readily discussing any issue on its merits.

The management must be certain of its intellectual ability to convince the workman as well as of the economic power over him which it has always possessed. An

additional requirement for the use of such a policy is, of course, that the facts which the manufacturer presents be such as to merit defense; not every manufacturer has a good cause to defend. Where there are certain facts in connection with the financing and management of his business which he knows would make any self-respecting and intelligent workman discontented, it would, of course, be futile for him to adopt a policy of frankness.

Other Factors of Success

The points discussed so far are, perhaps, the most important and fundamental. They do not cover the entire scope of the industrial relations work, however, as a number of other significant factors appear. The regulation of the wage scale has rested upon a basis slightly different than in a majority of factories. It has been the policy here to base wages upon the actual buying power of the dollar, rather than upon the law of demand and supply. During the last five years the wages here have risen steadily in proportion as the buying power of the dollar fell.

That cannot go on forever. The management recognizes that fact as do other manufacturers. For some time, however, the decreasing buying power of the dollar has been the thing of greatest importance to the working man. As conditions change, however, the relative importance of the various factors of industrial relationships change as well. Just now there is a temporary slump in the automotive industry. Every manufacturer has felt the pinch to a greater or less extent.

During the time of general low production per man and labor shortage, the White company appealed to its workers for co-operation on the basis of a mutuality of interest. Those workers responded as shown by the first table presented in this article. Now the company is doing everything economically possible to keep faith with the men.

"We have not decreased our working force nor our production, nor do we expect to find it necessary to do so," said E. W. Hulet, second vice-president and production manager, recently. "We have felt the slump just as every other manufacturer, but there never was a slump that didn't finally pass away and allow things to come back to normal. With confidence that the same thing will occur in this case, we are keeping our production and working force up to its usual level. We have always tried to provide continuous employment for our men and have always held that up to them as an advantage of working here. We would not be deserving of their confidence if we failed to keep faith at the first sign of difficulty when we have asked them to keep faith with us during more favorable times. The cycle of rising wages has passed, I believe; the chief problem today is to provide continuous employment. That is what we are striving to do and will continue to strive for, maintaining wages without any reduction." The hiring rate at the White plant is considerably higher at present than elsewhere.

Providing for the Individual

The policies thus far mentioned have chiefly to do with the relationships between the employees as a body and the management. These policies are, of course, the foundation and basis of any other methods that may be installed. They have been developed more fully and more progressively at this factory than in many others and serve to point the way toward further refinements which may eventually smooth out all the wrinkles. It is logical that such developments should come first; the more detailed individual developments being built upon them; unfortunately this is not always the case.

While methods and practice as regards the individual worker at this plant have not reached so high a degree of development, the practice in this regard points in the right direction. While there is no piece-work in this factory, the record of each man is kept as an individual, and in a fairly systematic manner his progress or failure to progress is noted and investigated by men in authority.

Nearly all of the foremen have been promoted from within the ranks, most of them having been with the company for many years. This fact has the usual favorable effect upon the morale of the working force.

A form of employee representation is in vogue at the White plant, which provides machinery for conferences between employees and the management. The employees' committees have no definite power, but it is through them that many of the long discussions between management and men arise and are thrashed out. The management does not pretend that the workmen have any power in controlling the management of the concern and does not believe that they desire any.

The factory itself is, needless to say, clean and well lighted, safety and sanitation being fully provided in every detail. Working conditions are on a par with those of any modern, well-equipped, efficient plant.

Limiting Dividends

Finally, the policy of limiting dividends to 8 per cent on capital stock should be noted as an important cornerstone in the foundation of the industrial relations policy of this concern. Analyze this statement for a moment: "Our policy has been in the past and now is to limit payment of dividends to 8 per cent on capital stock." Think of it in its relation to the labor policy.

Many manufacturers have appealed vigorously and constantly to their workmen to increase production, since increased production will certainly mean increased rewards to both capital and labor. The notion is a pleasant one, but the average workman reads the balance sheet or hears of vast excess profits taxes paid by his concern and doubts everything in his own heart. In this instance, however, after he has been informed in detail as to how much has been spent for maintenance, how much for a sinking fund, how much for wages and how much for each of the other factors of the business and is then informed that the payment of dividends is definitely limited, there is but one answer: he is certain to benefit very directly by the increased profits, production and prosperity of his company. And in many ways he is more truly a part of the company and more truly has a mutuality of interest with the management than has the worker in some concern that shares profits, holds stock, has "industrial democracy," etc. The idea provides, at least, food for thought.

Union Relationships

The question is sure to arise as to how the firm with this labor policy regards labor unions. It may be answered briefly.

A strictly open shop is maintained, but no discrimination is made against any man on account of his union affiliation. **The management never has and will not deal with union agents as regards problems in its own plant.** It has developed its own labor policy, satisfactory to management and men alike, and has no desire to change it for any outside organizations. It was to a large extent for this reason that the White Motor Company failed to subscribe to the rather broadminded "Declaration of Principles" issued a few months ago by the Labor Committee of the Cleveland Chamber of Commerce.

On the other hand, a friendly relationship is main-

tained between the management and local union leaders. Mr. Hulet recently addressed one of the local labor unions, and submitted to several hours of serious, but good-natured heckling after finishing his speech. The labor paper commenting on the speech afterward characterized it as having been very interesting and worthwhile throughout. An interesting commentary upon the relations between this company and the unions is that the director of industrial relations was formerly the president of a local union in Cleveland.

The following quotation from the company house organ is also interesting in this connection. Glenn E. Plumb, author of the Plumb plan for railroads, visited the White Motor Company recently: "If every industry in this country were managed under the White plan," said Mr. Plumb, after studying the White Motor policy, "we wouldn't need any Plumb plan or any other reform plans, for everything would be working all right."

While Mr. Plumb's unalloyed commendation of the White plan might have been influenced somewhat by the natural courtesy of a guest, his approval is very significant nevertheless.

These, then, are the main features of a labor policy which has accomplished exceptionally good results and has stood the test of some rather difficult times. What does this analysis of methods offer in the way of material for more general adoption?

It seems to offer either a very great deal or nothing at all; which of these it does offer can be decided only in a particular case. In looking at the White plan from this angle, it should be clearly recognized that each of the factors or methods outlined here depend for success largely upon every other one. There is little question but that the methods and practices described point clearly in the right direction for the solution of our industrial problems; but the fundamentals upon which these methods are based are so deep and so serious that any attempt to adapt them elsewhere without utter honesty of purpose, absolute truthfulness in every detail and a determination to bear the trouble and responsibilities which they bring is almost certain to result in disaster.

It is not necessary to point out, for instance, that if the company were making exorbitant profits, was establishing piece rates and then arbitrarily cutting them, or if it were indulging in any of those unsound economic and financial practices which are not entirely uncommon, it would only invite disaster to try to gain the co-operation of labor simply by the truthful presentation of all the facts of the case. It is essential that the true facts be such as will bear inspection. And so on, throughout the analysis of this labor policy it is evident that its roots go very deep into the affairs of industrial finance, management and administration. The White labor policy is not in any sense superficial. Brand, the hero of Ibsen's play by that name, had a fixed idea in regard to his relation to God; it runs throughout the play and is expressed in this phrase:

"All or none." And so it is likely to be with adapting the White labor policy to other plants.

The policy is interesting because of the lines of thought it points as well as because of the actual methods described. Industrial Utopia has not been attained, no halos appeared about the heads of any workman the writer saw in the plant and the executives readily admit many irregularities in the working out of the policy. But it aims in the right direction; and it has gone much farther in that direction than the majority of similar manufacturing organizations.

Exhibits of Automotive Interest at New York Electrical Show

Two electric passenger vehicles, one a new model, and a variety of industrial trucks were the chief points of interest. The industrials are greatly increased in efficiency for factory and general use by the addition of ability to raise and lower the platforms upon which freight is carried.

By P. M. Heldt

THE annual New York electrical show, as usual, comprised some exhibits which are the product of the automotive industry and others which interest it as consumer. The products of our industry exhibited included two electric passenger vehicles, electric trucks and industrial trucks and tractors, besides spark plugs and spot lights. Among the classes of exhibits which interest the industry as purchaser may be mentioned electric portable tools, electric furnaces, spark plug wire and electrically driven grinders and buffers. One farm lighting system, the Matthews, was shown, and there were a number of electrically operated refrigerating machines for domestic use. One of these, the Frigidair, is manufactured by the General Motors Co. The predominating tone of the whole exhibition was that of an appeal to the householder and there was less of an industrial atmosphere. Electrically operated washing machines were easily the most numerous represented class of exhibits, followed perhaps by electric cooking and heating utensils.

The two electric passenger cars were the Baker R. & L. and a new make, the Berg. The Baker vehicle is a coupe and is of the same design which this concern has been making for several years. The Berg car is the product of the Berg Electric Car Co., a recently organized concern

headed by Charles Berg, a pioneer of the electric vehicle industry. The company seems to work together with the Commercial Truck Co., as it uses the same rear axle construction and final drive as the latter company uses for its trucks. The rear axle consists of two channel steel members extending between gear housings at both wheels to which the "individual" motors are bolted. The armature shaft carries the pinion, and between this and the stationary internal-toothed gear ring in the housing there are three equally spaced sets of double planetary pinions mounted on a spider integral with the wheel hub. The larger ones of the planetary gears mesh with the central pinion and the smaller ones with the internal gear ring.

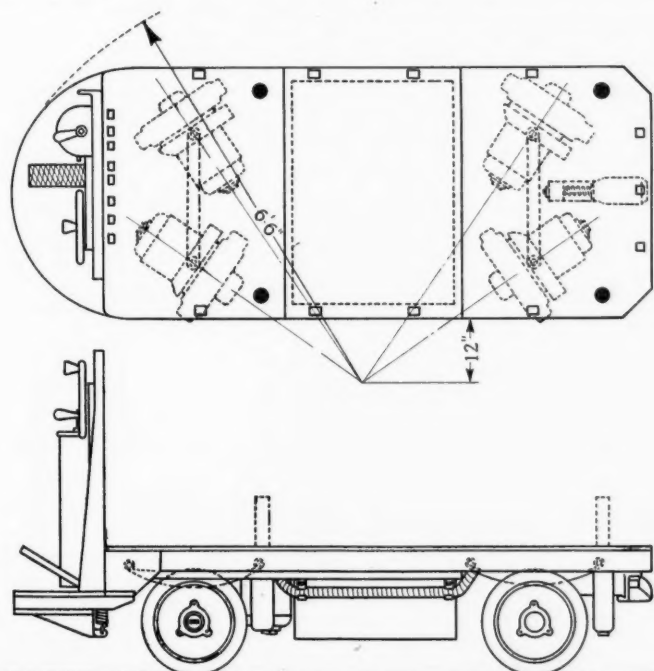
Berg Electric With Two Motor Drive

The vehicle exhibited by the Berg Electric Car Co. is a town car with underslung battery. It is equipped with two G. E. 28 ampere, 60 volt motors, and is geared for a speed of 20 m.p.h. The company will make a special drive for taxicab business, and one of the reasons for having the battery underslung is that it can be readily exchanged, so that the vehicle can be kept in service for 24 hr. a day, if desired. Another advantage of the underslung battery is that it gives a very low center of gravity and consequently great stability and freedom from swaying.

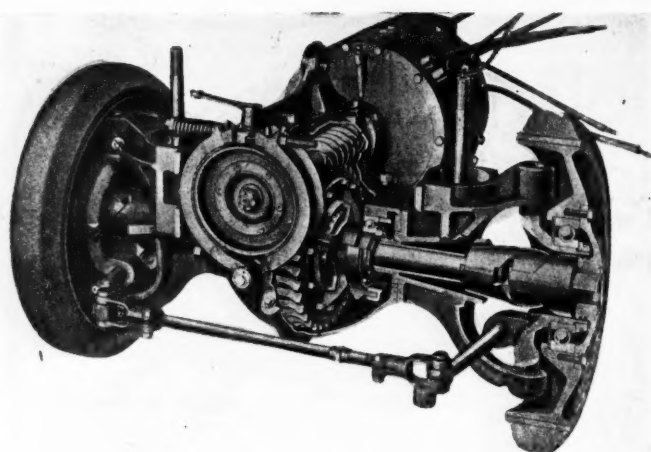
The battery equipment consists of 42 15-plate cells, and gives the car a radius of 60 miles on one charge. While the town car exhibited has a wheelbase of 118 in., the taxicab will be built with a wheelbase of 108 in., and it is expected to bring the taxicab price down to \$4500 as compared with \$5500 for the town car.

Electric motor trucks were exhibited by the Ward Motor Vehicle Co., the Baker R. & L. Co., the Lansden Co., the Commercial Truck Co., the Oneida Motor Truck Co., and the Walker Vehicle Co. Two of the makes of trucks shown, the Walker and the Oneida, make use of the electric motor frame for the rear axle, thus saving considerable weight. The Walker design has been in use for a great many years and is generally well known. It comprises a hollow armature shaft, with the differential at one end of this shaft, and internal reduction gearsets in both wheels, with two intermediate spur gears between the pinion on the central shaft and the internal gear secured to the wheel. In the Oneida truck a so-called eccentric gear is used, by means of which a very large reduction can be obtained with a compact mechanism.

Most of the novelties, from an automotive standpoint, were to be found in the industrial truck section. Industrial electric trucks and tractors were exhibited by the Terminal Engineering Co., Inc., the Baker R. & L. Co.,



See four-wheel drive, lifting type industrial truck



Baker industrial truck and tractor power axle

and the Lakewood Engineering Co. The Tec industrial truck (Terminal Engineering Co.) has four-wheel drive and four-wheel steering, one motor being mounted on each wheel. One of the advantages of this construction is that the truck can be turned around in a very short radius. The truck is of the elevating type, being intended to run under a loading platform upon which the load has been deposited, and then raised so as to lift the platform off the floor. The minimum outside turning radius is $6\frac{1}{2}$ ft., with an overall length of 10 ft. The steering gear and control are so designed that the driver's hands are always protected when he makes a turn in a narrow aisle or passes through a door. There is a combination lock latch on the controller. Trailers are being pulled through a spring coupler, which prevents towing shocks. This couples automatically and may be released from the dash. By means of the drum controller installed at the rear of the truck, speeds varying from $\frac{1}{2}$ to 10 m.p.h. may be obtained. The elevating jacks raise the platform $9\frac{1}{2}$ in. Electric lights are recessed into the frame to protect them against breakage. The truck is equipped with license brackets, electric horn and ampere-hour meter. The frame is supported on semi-elliptic springs all around. A special electric motor is fitted for operating the elevator jacks, and this is of the same size as the wheel motors. Wheelbarrow type platforms of a uniform width of 57 in. and in lengths of 6, 8 and 10 ft., are used in connection with the trucks. The battery is underslung.

Combined Truck and Elevator

The Lakewood Engineering Co. features its Tier-Lift truck, which elevates a load of two tons or less to any height up to 76 in. This truck has two very small steering wheels at the forward end, and two driving wheels of regular size at the rear. There are a pair of uprights between the front and rear wheels, on which the platform is adapted to be raised and lowered by means of an electric motor operating a pair of lifting screws. The battery box is secured to the rear of the uprights, and the driving motor is under this box. The Tier-Lift picks up, and loads directly into box cars or trucks, thus eliminating hand handling both at the shipping and receiving points.

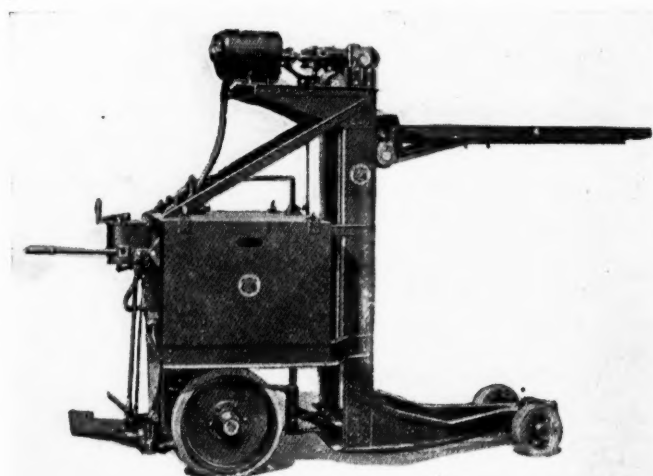
The Baker R. & L. Co. shows a crane swivel hoist truck of 2-ton capacity, an elevating platform truck of 2-ton capacity, and a three wheel tractor having a drawbar pull capacity of 1800 lb. The Baker company entered the industrial truck field only recently and has brought out a very interesting line. Its truck is fitted with a standard power or driving axle, having a heavy cast steel housing which encloses the worm gearing, differential, ball bearing and support. The combined cover and gear carrier is easily

removed from the axle while the latter is in position. Steering is effected by means of all four wheels, and use is made to this end of heavy cast steel axle ends which also form seats for the double coil springs supporting the frame and its load. These axle ends are secured to the center member of the axle. The power is transmitted from the differential through alloy steel axle shafts, in which are incorporated universal joints, the centers of which lie in the axes of the steering knuckle pivots. The wheels are supported by large, annular ball bearings, and they need not be removed when it is desired to withdraw the axle shaft and joint. The trailing or load axle uses the same tires, wheels, steering knuckle and end parts as the power axle, but the axle shaft, joints and other driving mechanism are omitted. The standard truck battery compartment provides for two trays of six cells of lead, and two trays of 11-12 cells of Edison battery. The tractor provides for four battery trays of an increased number of cells. The average size of lead battery for each machine is 12 cells of 15 or 17 plates for the truck, and 24 cells for the tractor. The motor is of the series wound, completely enclosed type, and is wound for 24 volts for use on the truck and for 48 volts for use on the tractor.

The tractor is made in both two wheel drive and four wheel drive forms, the axle construction and motor being the same as in the truck. Where the surfaces over which the tractor has to run are apt to be wet or a little slippery, four driving wheels enable the machine to exert much greater pull before spinning the wheels. Under normal conditions the starting drawbar pull of the two types is about 1500 lb. and 2800 lb., respectively. The normal drawbar pull is 400 lb. and the safe overland for 30 min. continuous pull 800 lb. for each type.

Baker Line of Industrial Trucks

The elevating platform truck is made in two wheel drive, two and four wheel steer. The elevating range of the platform is $4\frac{1}{2}$ in. The elevating mechanism consists of an auxiliary electric motor mounted underneath the load carrying platform, and driving through a spur gear reduction unit. This unit operates a screw and nut arrangement, by means of which a sub-frame, mounted on hardened steel rollers, is driven forward under a set of inclined castings, mounted on the underside of the carrying platform. Thus the load carrying platform is forced vertically upward through a distance of $4\frac{1}{2}$ in. The elevating mechanism is put into operation by means of a controller mounted on the dash adjacent to the operator. Suitable limit switches automatically open the elevating motor circuit at the points of maximum elevation and depression.



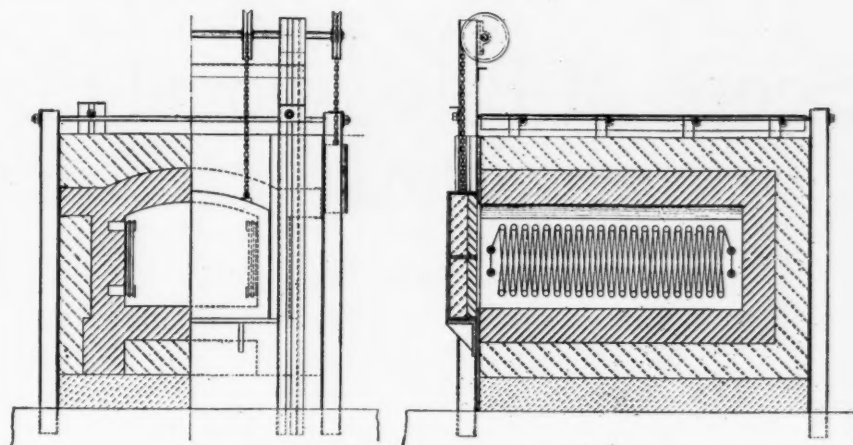
Lakewood tier-lift electric industrial truck

The platform may also be stopped at any intermediate point by manually opening the limit switch, the solenoid brake serving to stop the rotation of the motor.

The Electrical Alloy Co. shows samples of Magno ignition metal, a recently developed alloy for use in spark plug electrodes. This is said to be the only base metal material suited for use in the spark plug electrodes of airplane, tractor and heavy duty, high speed motors, and is claimed to be not only strong and tough, but also to resist corrosion perfectly.

The George J. Hagan Co. exhibits an electric furnace for heat treating steel. The electric heating elements in this furnace can be placed either on both sides and at the top, or at the sides alone. These heating elements are composed of nichrome ribbon. A double row of ribbon heating elements near the front takes care of radiation through the door. The chief advantage claimed for the electric furnace, as compared with the ordinary gas or coke furnace, is that a much closer temperature control is possible and, besides, the temperature in the furnace is more nearly uniform. The temperature can be controlled within a range of plus and minus 5 deg. Fahr.

The automatic control mechanism used with this furnace is made by the General Electric Co. Any standard



Sectional elevations of Hagan electric furnace

voltage up to 550, either direct or alternating, can be used. A Leeds-Northrup potentiometer type pyrometer measures and records the temperature and actuates the control mechanism. As soon as the temperature exceeds that desired by a few degrees, the current is shut off, and after it has dropped slightly the current is established again. In this way uniformity of temperature throughout the furnace is assured and no current is wasted in resistances. The temperature limit is about 1800 deg. Fahr. and the furnace is suitable for heat treatment calling for heating to this or a lower temperature.

Varispeed Tractor and Truck Engine Governor

IN designing a governor for internal combustion engines, various difficulties are encountered. One of the troubles met with is the tendency to "surging," which is very annoying, as it means very erratic speed control. Another difficult problem consists in insuring close regulation from no load to full load. Close regulation is essential in certain classes of belt work, particularly threshing, as a separator can do good work only if it is held down to a constant speed.

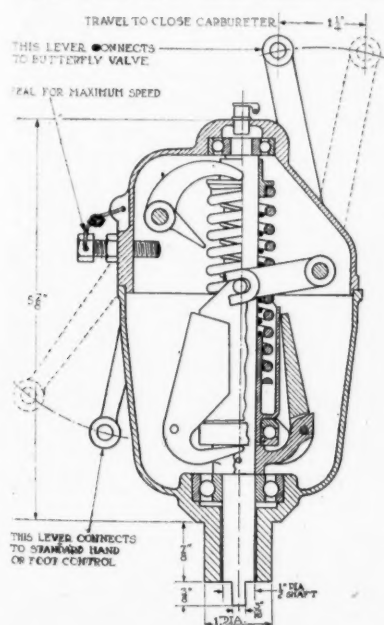
The governor illustrated here has been developed for this purpose by the S. W. S. Co. It is very compact and fully inclosed, so it can be effectively lubricated and protected from dust and moisture.

The speed of the motor may be varied at the will of the operator by the regular hand or foot control, as the engine is controlled at all times through the governor. If desired, the governor can be set to limit the speed of the motor, and this maximum speed cannot be changed except at the will of the owner, as it is provided with a seal.

The sensitiveness of this governor is due to

the use of ball bearings on the governor shaft as well as on the sliding sleeve. Another valuable feature is the long travel of the sleeve, which in combination with the long spring prevents "hunting," which is very detrimental to the motor.

The governor is mounted in a vertical position, and is driven by the camshaft or any other accessible part of the motor.



Varispeed governor

English Commercial Airplane

THE A. V. Roe firm in England has recently put out a new commercial machine. It is a triplane carrying pilot and four passengers at a speed of eighty miles an hour. The passengers are in an enclosed cabin with spring seats, while the pilot is behind and above where he has a good range of vision. The machine is built principally of standard Avro parts, such as can be obtained readily in England and France and in parts of the United States. This feature is of great importance in operating a fleet for commercial purposes.

The specifications, in brief, are as follows: Engine, Beardmore 160 hp.; weight empty, 2077 lb.; useful load, 1123 lb.; span, all planes, 37 ft. 0 in.; length overall, 29 ft. 8 in.; height overall, 14 ft. 3 in.; wing loading, 6.4 lb. per sq. ft.; power loading, 20 lb. per hp. The performance is: Maximum speed, 85 m.p.h.; landing speed, 45 m.p.h.; climb, 5000 ft. in 14 min. The ailerons are balanced by an auxiliary plane on posts above the middle aileron. The rudder is also balanced but the elevators are not. The landing gear has two wheels and a single skid. It is reported that this machine can travel 9 miles to the gallon (imperial) of fuel.

Scope of Educational Plans of Highway Transport Committee

This movement, started last April, has rapidly assumed a definite form and at a recent meeting the progress reports of the various sub-committees gave such definite form to subjects that they may now be weighed as to their practical value to the industry, which must support movement.

By Clyde Jennings

THE meeting of the Permanent Highway and Highway Transport Committee in the office of U. S. Commissioner of Education P. P. Claxton at Washington Saturday might be dismissed merely as a "progress meeting." The various sub-committees all reported progress, but none had reached a definite conclusion. Concerning the reports made at that time, there is little to tell.

But in the conversation regarding the progress made, there was a clarifying of the situation that could not have been other than very encouraging to all who are engaged in this work. As the progress of the sub-committees continues, the definite objectives are being set forth and the members of the general committee are getting a clear view of the subject that was shrouded in considerable mystery when this committee first convened at Ann Arbor in April, and later in Washington in May. At those meetings the chief decision was that:

Motor transport had given rise to a problem that was being very crudely handled and that this transport was certain to become such an important factor in the life of the nation and the people that it must be reduced to a science. Frequently the objective was illustrated by the positive science of railway transportation.

Of course, this was a very big task. The main thought at first appeared to be that of educating men for this service; an engineering course in Motor Transport, it frequently was called. The idea was to put such a course into a number of universities and to raise the standard of the men who will be engaged in this work. Also the need for many skilled and educated highway men was noted also and was provided for in the big plans then rather indefinitely outlined. Saturday the situation looked much less vague, but much larger. From that meeting this idea of what is going to be done was gathered:

1. The subject is bigger than motor transport and highways; it is practically the motorization of the nation.

2. Motor education must be injected into the entire scheme of education, beginning with the kindergarten.

3. An immediate objective of this education must be to lower the present mortality due to motor vehicles by education of those who walk as well as those who drive. Indeed, the walking element is considered the most important.

4. A specialized education for those who are to handle the motor transport. The chief men in this department must be raised to a degree that will enable many of them to be ranked as engineers.

If we take up these problems in turn, the work ahead of this committee will become much clearer.

1. No one will dispute the first premise. And the carrying out of the objective there stated will be perfectly clear in considering the next three. So:

2. Roy Chapin presented to the committee an outline of the "traffic safety" work being done in the Detroit schools. This begins with teaching the children the right and left rule of the road and it is furthered by the use of the "traffic game" in which aisles are considered the streets, certain children are selected to operate semaphores and others are selected as "fathers" to take children across the streets. Still others are designated as trucks and cars. This game is very popular, and as this work goes up the several grades of the school it is expanded as is suitable for the grades, eventually reaching a study of road building and maintenance and motor construction in the high schools. The effort is made to correlate the importance of highways and motor vehicles as soon as the pupil can appreciate this subject.

3. The only weak link in this form of education was drawn to attention by Dean F. L. Bishop of the University of Pittsburgh. He spoke of the need of immediately reaching the adult population, both walkers and drivers. It was agreed that the adults could be reached to a limited extent through the children, but probably not to the extent desired. A means of reaching the adult population would do much, it was admitted, to immediately reducing the mortality.

4. The specialized education problem is rapidly solving itself, the chief need being equipment in the way of approved courses of study and the organization of text books. There is no longer doubt that a sufficient number of universities are interested in this work and some of them already are shaping their courses to this end. Practically all of the agricultural colleges have courses in highway work and also in the handling of automotive farm equipment. The data for combining these courses into a motor transport course will be forthcoming from the efforts of this committee.

General Patrick of the army introduced to the committee Colonel Reese, who has charge of the educational courses in the army posts. Colonel Reese described briefly the courses his department has outlined for highway work and for motor transport work. These courses

are regarded as a distinct step toward the objective sought by this committee. An obvious deficiency in the army text books is that the strictly commercial element was lacking.

The basis of this entire work is that a man cannot be a good motor transport man unless he considers the effect of his transport on the highway as to both construction and maintenance and that the highway engineer cannot work effectively unless he knows intimately the automotive vehicle and has some vision of what the future of this traffic means to his highways.

While this feature of the work is still in the future, developments are rapidly bringing it to an active stage. Suggestions are being listed for chapter headings of the text book and of the best sources for getting these chapters written. This authorship will not be entrusted to one man, nor to any group of men representing one interest, but each chapter will be evolved by the group best representing the subject.

This work, naturally, will not go forward without organization and here comes in one of the chief functions of this committee. A tentative budget of \$25,000 has been outlined. Chief in the items is the salary of a man who will see that the work outlined is accomplished. His headquarters probably will be in Washington and his duty will be to constantly carry forth the work outlined, such as:

Promotion in other cities of such school courses as that in the Detroit school.

The organizing of promotion of more advanced education among service station workers.

The bringing before the proper persons the needs of promotion of automotive education. A direct problem in this connection consists in interesting rural teachers and societies in the vital importance of motor transport.

The compilation of the text book already referred to in this article.

The financing of this work is not much of a worry to the committee for the first year. The National Automobile Chamber of Commerce has appropriated \$10,000. The Tire Section of the Rubber Association of America is expected to join in this work. This association was represented at the committee meeting by H. S. Firestone and A. L. Viles. Mr. Firestone has been active in the work since its inception. It is expected that other trade bodies will supply any funds necessary after these aids.

The committee finds itself fortunate in having the support of the Bureau of Education in this work and much of the promotion of teacher interest will be left to the Bureau, which is giving hearty co-operation. A type of this support is illustrated in a bulletin just issued by the Bureau under the title "Lessons in Civics for the Six Elementary Grades of the City School." This is a teachers' document and contains much that is of interest in the way of safety instruction, including traffic, use of streets, nature of licenses and other similar material.

Commissioner Claxton offered to put into this and other bulletins practical suggestions referring directly to the motor traffic situation. He also asked if similar information was needed for rural schools and was told that the committee felt that the need was even greater. He said he was glad to have the recommendation.

There is a phase of this work that has not been referred to in the work of the committee, which the writer

injects of his own volition. This is the interpretation of the work to the practical ends of the industry.

One can hardly look over this program without understanding what its ultimate objective will mean to the sales department of a passenger car or truck factory. No one will dispute the feeling today that there must be better use of the passenger car as it relates to the walking passenger in the street. This one objective of the committee will be worth more than the price of the promotion of the idea, even if that objective should be very imperfectly reached.

No one needs to be guided to the conclusion that the mortality hazard must increase as the traffic increases unless there be an offset. It is perfectly true that the mortality hazard has decreased rapidly in proportion to the number of automobiles, but owing to the great increase of vehicles, the totals have become alarming.

It also is certain that many well trained men must be injected into the motor transport work if the purchasers are to get efficient use of these vehicles. There is amazingly little data on this work and the accumulation of additional information is an immense task. This committee has enlisted the aid of the National Research Council in this work and by this effort all worth-while research can be co-ordinated and be made available more quickly and efficiently.

All of us are convinced that there is great need of educational work in road building. The aid of the U. S. Bureau of Roads, so generously extended to this movement, assures a co-operation of road builders, road maintenance leaders and others on a work that means a direct sales promotion.

Commissioner Claxton in speaking of this phase of the work said something like this: "If this committee, by co-ordination of effort and the clarifying of the needs as regards highways, can save only one per cent of the amounts now available for roads, the committee will be more than justified."

Who is there in the industry that is not willing to assert that with any gleam of intelligence put into the co-ordination of road building and the supplying of an educated personnel for road building and road use, that the percentage of saving will not be far greater? We venture to repeat here that a more efficient road construction and maintenance means direct sales to truck makers.

Already a showing is being made by educational institutions. Most automotive manufacturers are familiar with the courses in the University of Michigan. This development will be welded into this new work. There is another phase, as exemplified in the new Automotive Laboratory of the University of Pittsburgh, promoted by Dean Bishop, who is a leader on this committee. There is also the movement for a traveling laboratory which will visit the garages and other places where mechanics assemble to interest them in advanced education along these lines.

The industry has long felt the need of many men who knew more concerning its product. Carried to its ultimate conclusion, this work means:

1. Co-ordinating all present means of education along definite lines and the encouragement of a specialized higher education and a weeding out of the inefficient so-called schools.

2. The insurance of a future supply of a properly educated working force by training them in motorization from the kindergarten days.

(Continued on page 847)

Motor Truck Impact Tests and Highway Materials

Some interesting developments are being obtained by the Department of Agriculture that promise well for the future of road building. The preliminary tests of how the force of impact is varied by the use of tires are especially interesting. Investigation of sub-grade materials being made.

SUCH important questions as how hard a heavy motor truck pounds a pavement when going at 5 miles an hour and at 15 miles an hour are being answered by investigators for the Bureau of Public Roads, United States Department of Agriculture, in a series of scientific experiments, which, when completed, promise to be of great value to highway engineers.

Already sufficient tests have been made to show that increased speed of a vehicle equipped with hard rubber tires tremendously increases the impact which its wheels make on the roadway where there is any unevenness. On the other hand, where pneumatic tires are used, increased speed adds comparatively little to the impact. It has been suggested that these tests will be of great value not only in settling the questions of design but may also lead to a rational basis for determining license fees for motor vehicles.

Trucks have been used in these tests varying in size from a 1-ton truck up to a 7½-ton truck carrying an excess load. Each truck was run over a special recording device embedded in a roadway, and the impact which resulted when one of the wheels made a 2-in. drop from a ledge built in the surface caused the deformation of specially prepared copper cylinders forming part of the apparatus. The magnitude of the blow was accurately ascertained in pounds by measuring the extent to which the cylinder had been forced out of shape.

Solid Tires vs. Pneumatics

Recent tests were made with a 3-ton truck of well-known make loaded with a 4½-ton load so that the total weight on each rear wheel was 7000 lb., the unsprung portion (that not supported by the springs) being 1700 lb. and the sprung portion (that portion supported by the springs) 5300 lb. The truck was equipped first with an old solid tire that had been worn down to a thickness of 1 in. Then, with exactly the same load on the truck, a wheel was used fitted with a new solid tire 2½ in. in thickness. And finally, the truck was equipped with pneumatic tires 42 x 9 in. and blown up to a pressure of 142 lb. per sq. in. The following table shows very clearly the bad effect an old tire is likely to have on a road surface and the greatly lessened impact produced by trucks when they are equipped with pneumatic tires. The sets show that as the vehicle's speed increased the impact from the old hard rubber tire increased greatly.

Approx. Speed	Height	Old Tire	New Tire	Pneumatic Tire
5.7	2"	11,600	9,400	7,100
10.2	2"	18,500	14,100	7,800
14.6	2"	26,500	18,700	8,300

Related to these tests is another series which utilizes the figures obtained in the first experiments. A number of paving slabs were tested by means of a machine designed to give impacts equivalent to those produced by the rear wheel of the truck already referred to. The unsprung portion of the weight of this machine is 1500 lb. and the sprung portion weights 6000 lb. The tests were made by raising the entire weight through a height of ⅛ in., allowing it to fall 500 times, then to a height of ½ in. with 500 repetitions, then ¾ in. more in height, and so on until the slab failed. To date about 12 slabs have been tested, laid on a rather wet subgrade.

A surprising difference has been found in the strength of the different types of pavements tested. The total number of blows required to cause failure have varied with the different slabs from 67 up to almost 2000. All these data promise to be of the greatest value to engineers in selecting material for roads of various types.

Relative Wear of Different Pavements

The Bureau of Public Roads is also making a study of the relative wearing qualities of different types of pavements and tests have been about completed on a short section of pavement containing forty-nine different types subjected to the wear of a special truck equipped with five large cast-iron disk-like wheels. The relative wearing qualities of hard, as compared with soft, brick are brought out very distinctly in this test. The resistance to wear of various kinds of stone block sections is also shown up to good advantage. A chance to compare grout and asphalt fillers for both brick and stone block is furnished by this investigation. Likewise, the relative wearing qualities of concrete when mixed with various kinds of coarse aggregates is indicated.

The investigation of subgrade materials started a few months ago with the co-operation of the District engineers and State engineers is proceeding at a very satisfactory rate. A number of samples have been received from various parts of the country and laboratory analyses of many of these samples are partially completed. The methods being used by the Division of Tests will shortly be published as a paper, so that any other laboratories wishing to conduct similar investigations may have some guide as to the method of procedure being followed by the Bureau of Public Roads.

The samples analyzed have been taken from parts of the roads that have failed very badly as well as from adjacent parts of the same roads that have withstood heavy traffic successfully. It is hoped that by a comparison of the laboratory results on these samples with the reported behavior of the road in service differences in the subgrade materials will become apparent, so that we will be able to say what physical characteristics soils must possess to give them high bearing value.

French Manufacturers Ask Prohibition of Automobile Imports

Although there is already a 45 per cent duty on imported automobiles, French car makers have petitioned the government to prohibit automobile imports. Exchange rates, in the case of America, give French builders additional 200 per cent advantage, yet they consider exclusion necessary.

By W. F. Bradley

CONSIDERING that their industry is seriously threatened by foreign, and particularly American, competition, and that normal development is hindered by reason of the high cost of fuel and heavy taxes, the French Syndicate of Automobile Manufacturers has petitioned the Government to take steps for their relief. The most radical of the measures asked for is the prohibition of all automobile imports into France.

During the war private importation of automobiles into France was forbidden. After the armistice a 70 per cent duty was imposed. This was replaced on April 23, 1919, by prohibition of imports, and on July 22, 1920, imports were allowed with a duty of 45 per cent. The Government reply to the request of the automobile manufacturers has not yet been received, and probably will not be given for a couple of weeks. Minister of Commerce Isaacs, in an interview, criticizes the French manufacturers for having devoted practically all their attention to the production of highly finished and costly automobiles of little value to the persons who want a utility machine.

In setting forth their case the French manufacturers trace the history of the automobile industry from the outbreak of the war. The following are the main features of their petition.

On the outbreak of war the automobile industry was placed at the disposal of the War Department, and on the request of the Government automobile construction was abandoned for munitions. During this time large quantities of foreign automobiles were brought into France for the use of the armies.

Enormous quantities of automobiles remained in France when peace was declared. The danger of throwing these stocks on the market was pointed out to the Government and the suggestion made that they should be distributed among all the Allies, in accordance with their powers of absorption. No attention was paid to this suggestion, nor to a later one that all foreign automobiles should be kept by the Army or by the various government departments. Instead of accepting these suggestions, army automobiles were placed on the market in small lots, so that the public gradually became accustomed to foreign machines. At the present time the sale of foreign automobiles is not finished and it is proposed to throw immense quantities of automobiles on the market at once.

While this policy was being followed, the Government encouraged manufacturers to increase their output, and in an important speech advising intensive production the Minister of Reconstruction promised plenty of cheap coal. This advice was followed, and for a time conditions looked promising, for the market had been starved during the hostilities, and the lessons of the war had shown that there was an immense opportunity for commercial trans-

portation. Under these promises very favorable prices were decided on, and orders poured in.

Difficulties soon arose. The efficiency of labor dropped off, and the 8-hour day reduced output. Strikes further diminished output and delayed delivery. Then raw and partly finished material failed to arrive in sufficient quantities, and the promise of cheap coal not having been kept, prices rose. Automobiles could not be sold to the public at the price at which they had originally been offered, and to make matters worse the supply of electric current became insufficient, thus increasing overhead charges.

Contracts with clients became ruinous, but had to be fulfilled; it was believed that when the unsatisfactory contracts accepted up to the end of 1919 had been completed, business could be resumed at normal rates. Suddenly orders not only ceased, but contracts placed with manufacturers were withdrawn by persons who refused to pay the higher prices. In consequence, manufacturers found themselves faced with only a small number of orders which would have to be filled at a loss. During this time foreign manufacturers had come on the French market with cars which undersold those of home production.

As a remedy for this state of affairs the French manufacturers propose an embargo on all foreign automobiles, but are willing to admit spare parts for cars already in the country.

Gasoline, which cost 8 cents per litre before the war, is now being sold at 60 cents. This is due in a considerable measure to the adverse rate of exchange, but the price is further increased by the import duty on gasoline and the repeal of this is asked for. In addition, the Government is asked to study the question of home-produced fuel, and particularly alcohol-fuel. More favorable shipping rates are also demanded.

The appeal of the French manufacturers is directed against America, for that nation is the only one capable of offering any competition at the present time. It should not be overlooked that French manufacturers are protected at the present time by a 45 per cent duty, and in addition have the advantage of exchange rates which, in the case of America, give them a further advantage of about 200 per cent. The advantage is further increased by the fact that in estimating the value of automobiles for the purpose of duty assessment, the shipping charges are added to the invoice price and in many cases the assessors refuse to accept the American invoice price. Many of the more far-seeing members of the industry are opposed to the appeal of the manufacturers, their contention being that French manufacturers are quite capable of meeting any foreign competition on their own market and that the real danger is not at home but on the world's export markets.

American Exports Not Increasing by Leaps and Bounds

A careful study of statistics shows that the actual volume of goods exported from this country is a little below the normal level of growth. Export figures expressed in dollars, instead of volume, have tended to mislead us. Speaker at meeting analyzes export problem thoroughly.

NEW YORK CITY, Oct. 14.

THAT our exports looked at over a period of years are not increasing by leaps and bounds, as supposed by many, but are really adjusting themselves to a normal position of increase from which they were disturbed by the war, is the opinion of W. L. Saunders, chairman of the board of Ingersoll-Rand Co., in his opening address before the eleventh annual convention of the American Manufacturers' Export Association to-day.

The actual volume of our goods exported is a little below the normal level of growth as charted over a period of years. The figures of our exports in value expressed in dollars as reported by our government have been responsible for many misconceptions in the growth of our foreign trade, and if we wish a truer business estimate of our growth of foreign trade we get it by considering the cubical volume of merchandise exported.

Take an example: The value of our exports in dollars grew rapidly from 1911 to 1920, chart 2, but the volume of merchandise did not increase in any like proportion, in fact, the volume has fallen off since 1917, whereas the dollar value has risen heavily since 1917. The chart shows that the tonnage has fallen off approximately at the same ratio as has the volume.

When the volume of our foreign trade in exports and



Fig. 1

This chart shows the percentage of total imports and exports of the country which have passed through the Port of New York in 30 years, 1890 to 1920. The chart shows that in 1890 the exports from the Port of New York were 40 per cent of the total and the imports 65 per cent. Between the years 1915 and 1920, especially the war period of 1917 and 1918, our exports went up rapidly when Europe was at war and we were out of it, and when we went into the war they fell and have been declining ever since. The graphic lines of exports and imports crossed each other between 1917 and 1918.

imports extending over a period of 40 years is studied, with corrections being made for dollar values, it is seen that actual amount of merchandise now being exported is a little below the normal line of growth, or not up to what our export trade should show. This is shown by Fig. 3. If the line of imports is studied it is shown that our imports are not up to what the normal line would indicate but are just coming back to that point. Saunders believes that to obtain world trade, American manufacturers must take a leading part in it themselves. The most critical situation in foreign trade is that of finance, which involves banking and investment problems. This is the job of the bankers. A manufacturing business requires large capital and a quick turnover and without a quick turnover prices increase through excessive overhead. Mr. Saunders is a disciple of that school that does not favor adopting the German system of financing trade in which the banks control the industries. He prefers the industries to be controlling factors in the banks. Continuing, Saunders said:

"There are certain large manufacturers, such as the Steel Corporation and the Standard Oil Company, who can take care of the credit situation in foreign trade in their own way and through their own organization, but speaking for the large body of manufacturers, the ma-

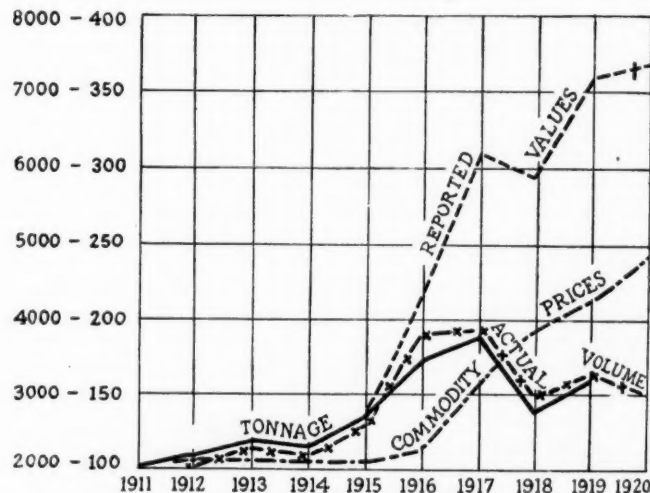


Fig. 2

This chart shows how our exports considered by volume have not increased in any sense as compared with them when their value is considered in dollars. This indicates that our exports are not increasing by leaps and bounds. The line marked "Actual Volume" is determined by dividing the reported values by the Bureau of Labor Index, and this compares closely with the actual tonnage or volume computations made by the U. S. Shipping Board shown in the line marked "Tonnage." The figures at the extreme left in the vertical column are in millions of dollars as reported by the Government. The figures in the next vertical column, 100, 150, 200, etc., are index numbers of the Bureau of Labor, 100 being the base line.

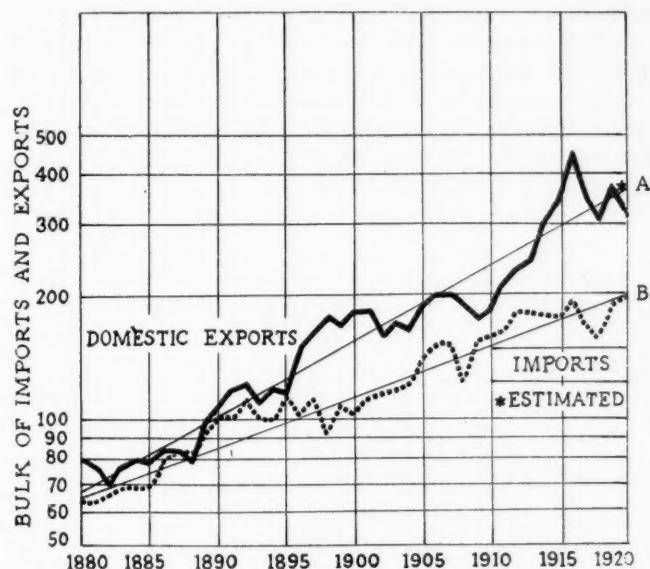


Fig. 3

This chart shows that the actual amount of goods now being exported is a little below the normal line of growth, this normal line being represented at "A." It further shows that our imports have been considerably below the normal line of import growth "B" and that they are just coming back to this point. The figures in the vertical line to the left show percentages from normal based upon the Bureau of Labor index.

chinery has already been provided through legislation by which this financial side of foreign trade may be properly handled. I refer to the Webb Law, which permits combinations and price fixing in exports, and the Edge Law, which provides banking and investment machinery. Let us suppose that an Edge bank were located in England and another in France and another in Italy. These banks might be controlled by investors with a centralized Edge bank in New York. When manufacturers seek to finance a trade in the Orient, for instance, involving many months of time credits, they should go to their banks and the banks should go to the Edge bank to aid them in credit information and in financing. This, it seems to me, is the only practical way by which we manufacturers can hope to do our part in organizing permanent machinery for world trade."

In regard to the exchange problem, Saunders said:

"It is well known that Italy, France, and to some extent the United Kingdom, are on a paper, not a gold basis. The old parities of exchange were stated in terms of gold, or with respect to countries which were not entirely on a gold basis, exchanges were measured upon a fairly fixed and standardized basis of currency. Because of the present inflated conditions in Europe these old parities do not apply, and, as indicated in the diagram, exchange rates are now at a discount which approximates the discount of the nations' currencies from gold."

"Under normal conditions, where all the principal countries are on a gold basis, the fluctuations in exchange are due to the balance of debts over claims, interest of money, panicky conditions, distance, etc., but with all these circumstances combined and in action, exchanges on a gold basis will scarcely vary over 10 per cent; in fact 10 per cent would be considered an extraordinary variation, but with the introduction of currency inflation this percentage goes up to enormous figures."

"The lessons—one can hardly say conclusions—drawn from these exhibits are that commodity prices as affected by currency inflation have distorted our views in regard to the exports and imports of the United States; that our foreign trade is now following only normal increases."

"That departure from the gold standard, and increase of bank loans, through credit inflation, are the principal and the dangerous causes which effect high prices. That this condition is also the principal reason why exchange rates in Europe have fallen to so great a degree."

"That our manufacturers need not be alarmed lest it be necessary to restrain efforts to enlarge their exports on the ground that the products of Europe in manufactures must be admitted here to balance exchanges."

"We all agree that better nations can pay their balances only in gold, goods or credits. There is little or no chance for European nations to pay their debts in gold. As to goods, it is not necessary that the goods be imported into America, particularly in the shape of manufactures. America is in a position to help foreign nations by credits, loans and investments. This is what Great Britain has always done. During the past years she has invested \$20,000,000,000 in foreign fields, and in doing this she has prevented a premium on the pound sterling. We can, by investing in government loans and foreign industries, accomplish the same purpose and help strengthen our customers abroad so that they may pay for our exports."

"Manufactured products from the viewpoint of economics can best be produced in a country like America with its large fields of raw material, its factories, the mechanical skill of its men and its experience in quantity production."

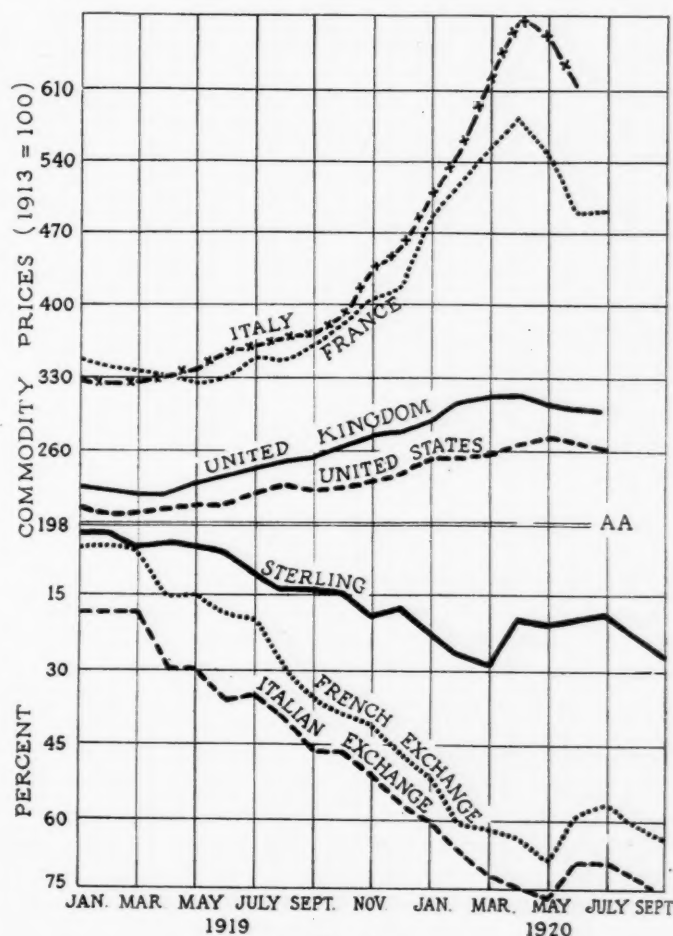
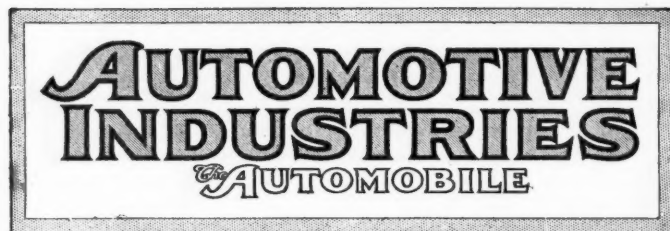


Fig. 4

This diagram shows that in direct proportion as nations go off the gold basis, both exchange with a gold country like the U. S. A., and prices in the inflated country, are increased. The diagram shows the relation between commodity prices and exchange rates. The horizontal line "AA" in the middle being the line of parity. Above this line are wholesale commodity prices reduced to a common basis, that of 1913; and below the line are exchange rates measured by percentages. The increase in exchange rates follows in degree the price increase



PUBLISHED WEEKLY
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Vol. XLIII

October 21, 1920

No. 17

THE CLASS JOURNAL COMPANY

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Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of Associated Business Papers, Inc.

Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

The Truck Express

A FULLY loaded 1½-ton truck recently made 935 miles in 24 hr. at the Indianapolis Motor Speedway. The fact that the speedway is in no better condition than the average hard surface road and, in fact, is undergoing repairs requiring a temporary bridge at one part of the track, indicates what is possible with a truck designed particularly for pneumatic tires. When we stop to consider that the distance traveled is very nearly the same as from New York to Chicago over the highways, one is brought to a realization of what could really be done provided proper road facilities and policing were available.

If it were possible, for instance, to set aside certain hours at night in which the speed limits over the highway were discontinued for fast-moving, light express trucks, it would be possible, in the light of this test, to do some remarkable things in the way of quick transportation. The truck demonstrated at Indianapolis was checked by impartial observers as a stock

model and no particular effort was made to get the utmost speed. The test was rather to show the ability to run continuously at a rate of speed well within the capacity of the truck. The fact that the truck averaged over thirty-eight miles an hour, and at no time ran under thirty-five or over forty-two, demonstrates the possibility of continuous travel at a distance-consuming pace with an up-to-date type of commercial vehicle.

The time has come when we must revise our ideas of highway travel to a considerable extent and bring them more closely parallel to what we expect over the railroad lines. As yet we are only scratching the surface of what can be done with pneumatic equipment.

Road Wear and Types of Final Drive

IT is generally agreed that the wear of roads, or the amount of damage done to roads, by vehicles passing over them, depends more upon the unsuspended than the suspended part of the weight of the vehicle. Also, in order to limit the amount of damage which can be done it has been found expedient to specify the maximum useful load or the maximum total weight of trucks which can use the public highways. Such load capacity limits are provided in the motor vehicle laws of many states.

It has now been suggested that, inasmuch as trucks with relatively small unsprung weight cause less road destruction than those with large unsprung weight, and as the tendency to damage the roads is the reason for the limitation of load capacity, the limit should be set higher for trucks with small unsprung weight, as, for instance, chain driven trucks. The proposal is not without justification, but we doubt whether it will meet with a favorable reception, owing to the difficulty of putting the plan into practice. In the first place, there is no definite ratio between the destructiveness of sprung and unsprung weight, respectively. That there can be no definite proportion will be readily realized when it is considered that the stiffness of the springs can be gradually increased to a point where the springs are practically ineffective, and the sprung weight then obviously has the same effect as the unsprung weight. Another objection is that it is quite difficult to determine the unsprung weight after a truck is assembled. Furthermore, if allowance were made for variations in the relative proportion of the weight below the springs, allowance should certainly also be made for differences in the types and perhaps even in the relative sizes of tires used. For instance, it is obvious that a pneumatically tired truck will do far less damage to a road softened by rains or thaws than a similar truck on solid tires. Finally, four-wheel-drive advocates might well demand a higher load capacity maximum, as the damage to the roads depends upon the weight per axle, and when the load is evenly divided between the two axles the load limit beyond which excessive road wear may be assumed to begin, naturally lies higher than when nearly all the load is carried on the rear axle. This fact is taken account of by most for-

eign automobile laws, which stipulate that the maximum load per axle must not exceed a certain value.

It is evident from the above that any attempt at the establishment of differential load capacity limits on the basis of details of construction and their probable effect upon road wear or road destruction, would entail great difficulties in the application and enforcement of the law, and legislators would undoubtedly look upon such proposals with aversion.

"Welfare" Manager's Defense

SOME very frank statements and critical estimates of "welfare" work have appeared recently in AUTOMOTIVE INDUSTRIES. Some of those statements served to throw the average Welfare Manager into a rather unfavorable light. In many cases, perhaps, he belongs there. As pointed out previously, however, the fault lies with executives higher up in the management when such efforts do not succeed.

That the case for the defense may be concretely stated, however, it is a pleasure to print the following excerpt from a letter written by the Personnel Manager of a large automotive concern. The letter was written to comment upon a recent article in AUTOMOTIVE INDUSTRIES relative to the success or failure of "welfare" work. The letter said in part:

"I believe that even a highly capable Industrial Relations Manager is greatly handicapped . . . if he does not have the whole-hearted sympathy and cooperation of his superior.

"During the war I was hired to be manager of the Service Department in a shipyard. I came to the conclusion that the General Manager had heard that title somewhere and liked the sound of it. I was given a rather free rein and saw some good results, but I do not recall that the General Manager, or the owners even, took the slightest interest in the subject. I felt then that they absolutely wasted thousands of dollars which could have been saved.

"The real trouble in that case was that the Manager did not know where the Service Department or the Industrial Relations Department fitted into the organization."

The quotation refers, of course, to a particular case, but is worth consideration by the executive as one of the problems which arise in the work of the personnel manager working under his jurisdiction.

Economics of Snow Disposal

DURING the past winter, when the snow problem in New York City became so serious, various weird plans for getting rid of the snow were suggested, such as the use of flame throwers and of asphalt heaters, as well as the use of steam and hot water. At first glance the proposal to melt the snow artificially does not seem very practical. However, an analysis of the cost figures does not show the plan to be as chimerical as might be supposed, and as inventive talent is being applied in this direction it is not at all unlikely that the solution of the problem, at least so far as the large cities are con-

cerned, will be found in melting the snow by some efficient apparatus.

Snow has a latent heat of 144 B.t.u. per lb., and as the snow is likely to be at a temperature somewhat below the melting point, and, moreover, the water must be raised to a temperature materially above the melting point so it will not freeze before reaching the sewer basin, about 200 B.t.u. per pound of snow must be supplied. No scheme by which the heat is to be supplied to the snow lying on the ground is likely to prove economical, as the heat naturally tends to rise, and if the flame were merely played against the snow and the hot gases were then allowed to escape, there would be great waste. By a rational design of the apparatus it would be possible to secure a very high efficiency, as it is merely a question of transferring heat from one medium to another, the latter being at a very low temperature and therefore very receptive for heat. If we regard 200 B.t.u. per pound of snow as the useful transfer of heat, it should not be at all difficult to secure an efficiency of 70 per cent, which would be equivalent to the expenditure of 286 B.t.u. p. lb.

Now, one cubic foot of freshly fallen snow weighs on an average 9 lb., while one pound of crude oil or kerosene contains about 19,000 B.t.u. Therefore it takes 2,570 B.t.u. to melt one cubic foot of snow and this requires the burning of 0.135 lb. of oil. An average horse load of snow is equal to about 68 cu. ft. and a large motor truck load, to about 170 cu. ft. Hence it takes about 9.2 lb. (about 1.5 gal.) of oil to melt a horse load of snow and 3.5 gal. to melt one truck load. With crude oil selling at 5 cents per gallon or so it will be seen that the fuel cost is a small item as compared with the cost of carting the snow away.

Of course, the cost of fuel is only one of the items of cost of the melting process. If the snow must be shoveled into the melter, there is a very considerable labor item, and besides we have to consider interest on investment in machinery, depreciation and possible repair expense.

A Hint About Buses

WHEN the city of Bridgeport put its street cars in the barns and took to motor buses there was great joy. Strange to say, when the street cars again appeared they were welcomed in parts of the city with cheers. We do not regard this as a condemnation of the bus, but it supplies a basis for thought that was broadly hinted at in George Graham's talk before the electric railway men. The ground work is this:

Any transportation line to be successful must be closely managed. It must assume the obligations as well as reap the profits. The Bridgeport bus lines were independent ventures. The managers did not assume a responsibility of comfort for passengers, or the fixed time tables. They went where fares appeared to be most abundant.

So we venture Mr. Graham was right in his position that the future of the bus lies in management and if used as an ally of electric transportation it would fare best.

Depression Does Not Presage Panic

Signs Already Seen of Early Recovery

**Demand for Cars Will Revive as
Soon as General Conditions
Are Stabilized**

(By JAMES DALTON)

NEW YORK, Oct. 18—After several months of persistent optimism, Detroit has begun to realize that there is something wrong with the automotive industry just as there is with every other industry. There are surface indications that sentiment in the world's greatest automobile center will jump from one extreme to the other. Just as it has refused until now to see the unpleasant aspect of affairs it may not be able to visualize the encouraging signs.

When a man is seasick, he's afraid one minute that he will die and the next that he won't. That applies more or less to the men in the automotive industry today. It probably is harder now than it has been at any time since readjustment began to make sales, collect cash and pay bills. The man who is able to see the silver lining to the cloud under these circumstances would be happy with mal de mer. But seasickness is seldom fatal and recovery is rapid.

This industry has a strong constitution. It has been exposed to some mighty rough weather in the past few months and has suffered in consequence. It still has a high temperature but it will recover, although convalescence may be slow. That readjustment has progressed so far with so few casualties is really remarkable. The danger probably is past but it is too soon to tell the doctor to stop calling.

Stabilize Whole Fabric

Industry as a whole constitutes a complicated mechanism and industries are interdependent to a large degree. Stabilization of the automotive industry depends upon the stabilization of the entire fabric. Every time this country has had a panic it has resulted from over-inflation and over-expansion. When the present year began conditions were ripe for a panic but there was none and the situation fundamentally is much sounder than it was six months ago. Deflation has been brought about in an orderly and systematic manner.

The Federal Reserve Board is in much the same position as the dentist who is killing a nerve. The board's operations have been painful but essential. If it had not been for the Federal Reserve system the country now would be in the middle of one of the worst panics in its history. Previous panics have been due primarily to bank failures. No banks of

consequence which have been members of the Federal Reserve system have failed this year and none will fail.

Almost everyone admits that normal conditions cannot be restored until prices reach a lower level and the value of the dollar is enhanced. There usually is a qualification to this admission. Each individual will tell you why prices can't come down in his own particular line but will insist that the men in every other line are profiteers. The farmers and the wool growers and the cotton raisers are examples.

Prices Will Stay Down

The fact remains that prices are coming down and will stay down. The sooner they are stabilized at a level where the ultimate consumer is convinced they will go no lower for a while the sooner will depression begin to disappear and business to improve. The descent probably will be halted, temporarily at least, within sixty days.

When that time comes the automotive industry will begin to improve. Its prosperity depends upon the general prosperity of the country. It is probable the price factor will have less bearing on the sale of motor cars than upon almost any other commodity. Values will be considered more than price. If the living costs of the average family have been reduced substantially the head of that family won't begrudge a few dollars more for the car he wants provided he is convinced he is getting value received, but he must be convinced of that.

AUTOMOTIVE INDUSTRIES has pointed out many times that readjustment would leave failures in its wake but that their total would be insignificant when compared with the industry as a whole. Times like these mark the survival of the fittest. It was stated in these columns last week that no large automobile manufacturers were in serious financial trouble and that holds true. Several of the small ones are in a bad hole, however, as was to be expected. They were not established strongly enough to withstand adversity.

Failures to Be Expected

It would not be surprising if there were failures in the next two months. In fact it would be surprising if there weren't. It is not likely, however, that there will be any of real magnitude. Undue importance should not be attached to these unhappy incidents. There is no reason why they should have a serious effect upon the industry as a whole. Bankers will scan credits closely but the manufacturer who can present a clean bill of health will be able to get enough money to meet his absolute needs.

Just as the steel industry was the last to feel the full effect of general depression, the parts makers are the last to get

(Continued on page 842)

Industry Secure, Says M. & A. M. A. Head

**Transportation Needs of Country
Will Assure Growth—Replacement
Business Big Factor**

NEW YORK, Oct. 16—After the regular monthly meeting here yesterday of the board of directors of the Motor and Accessory Manufacturers Association, representing approximately 360 makers of automobile units and equipment, President C. E. Thompson issued the following announcement:

"We have absolute confidence in the fundamental soundness and stability of the automotive industry. A comprehensive survey of conditions throughout the country and first-hand statements from various members of the association indicate that there are now marked signs of improvement in the automobile field. The automobile industry has naturally been affected, as have other industries, by the economic readjustment of business conditions coming as an aftermath of the war. This process has been most orderly and constructive and the basic strength and essential character of the automotive industry are beyond question.

"Governor W. P. G. Harding of the Federal Reserve Board stated at a meeting of the Motor and Accessory Manufacturers Association in Cleveland last month: 'There are four great fundamental essentials—food, fuel, clothing and shelter; and in order to provide these necessities transportation looms up as an absolutely important factor.'

"The automotive industry is a transportation industry. The sound progressive development of the automotive industry is assured by the enormous transportation needs of this country.

"The replacement business of motor vehicles looms up as a factor of paramount importance. This replacement business alone, even when coupled with only an average increase in the normal demand for new motor vehicles, is of sufficient size to keep the industry in a healthy and progressive condition.

"The automobile is to-day a deep-rooted factor in the economic and social structure of America. The demand for motor vehicles will continue and will grow in proportion to the transportation requirements of the nation."

TO MAKE NEW STEAM CAR

GULFPORT, MISS., Oct. 18—The Carter Automobile Co., which holds patents on a steam-driven passenger car, has nearly completed its plant here for the manufacture of the new automobile, and work will start Dec. 1.

Unemployment Serious in Detroit

Mayor Asks Plants to Ration Out Work

Factory Executives Expect Further Decreases—Many Skilled Workers Leave City

DETROIT, Oct. 18—Mayor Couzens has issued an appeal to Detroit manufacturers to ration work to the approximately 50,000 skilled employees now idle here. He says it is the duty of manufacturers to care for them because they persuaded them to come to the city through promises of high wages and plenty of work. He suggests that the factories employ them on alternate days so they will not have to return to their homes in other cities.

The appeal is hardly likely to meet the favor of manufacturers. In plants practically closed there is no chance and in others, such as Cadillac and Packard, officials say when the slump came they culled the most inefficient and laid them off, retaining the faithful, consistent workers. The same is true in all other plants and manufacturers declare it is asking too much to ask them to take on men who shirked during the period of abnormal prosperity.

DETROIT, Oct. 16—With 54,000 men idle in Detroit, the effect of the depression in the automobile industry is now being felt, and manufacturers and employment executives say that the drop will be even more severe and will continue for the next two or three months at least. Dodge Bros. is the only company in the industry here which is taking on men. All of the others are laying them off with the possible exception of Ford. The Ford company is not actually laying off employees but wherever one does leave he is not replaced. Employees in the Ford offices and administration buildings are given opportunity to go to the factory, on account of the slack work in the offices.

There are approximately 300,000 men employed in the city of Detroit in normal times. On April 1, at the peak of the manufacturing period, there were possibly 50,000 more than that number. The Employers Association of Detroit, taking figures from seventy-nine of the larger plants throughout the city, figure 18 per cent of the employees now idle. The Hupp Motor Car Co. is in practically the same position as Ford. The company is not hiring any men, nor is it laying any

off, though when they quit they are not replaced.

Gemmer Mfg. Co., makers of steering gears, which has accounts with sixty of the larger automobile companies, closed down this week until after election, throwing 500 men out of employment. Nelson Motor Car Co. is down; Maxwell-Chalmers is down and Hudson has laid off about 4900 men. Ordinarily Hudson has a force of about 7900. Cadillac officials say they are keeping up production despite the fact that they have laid off about 1500 men within the past month. They maintain the increased efficiency on the part of the men retained is responsible for their keeping up production. Fisher Body Corp., which employs approximately 15,000 men in its thirty-two plants, has laid off several thousand.

Common Labor in Demand

A report from the State Employment Bureau, headquarters at Lansing, is to the effect that while there is a decided slump in demand for skilled labor, there is a steady demand for common labor. The figures are compiled from reports in twelve districts of the State. The same situation may be said to exist in Detroit, though there is still considerable idleness among the common laborers.

The result of this steady decrease in employment necessarily will mean still further production curtailment but in the opinion of distributors and dealers—and they are the ones in best position to know—that is as it should be. Under present conditions distributors contend it is the wise policy for manufacturers to stop production for a time or at least cut their outputs sufficiently to permit demand to absorb the surplus.

INDUSTRY LOW IN NEW YORK

ALBANY, N. Y., Oct. 18—The New York State Industrial Commission reports a decline of 2 per cent in the number of workers employed in the State in September. The automobile industry is one of the most seriously affected by the decline which began about six months ago. Plants manufacturing cars and parts reported a decrease of 18 per cent following the 20 per cent curtailment reported from May to August.

TIMKEN-COLUMBUS CLOSES

COLUMBUS, Oct. 18—The Columbus branch of the Timken Roller Bearing Co., which has been on short time for several weeks, closed down entirely Oct. 15. There were 300 men working at the plant, all of whom were laid off indefinitely. E. C. Rohn, superintendent, attributes the shutdown to the general slump in the automobile business. When curtailment first started there were 1600 men employed at the plant.

Goodyear Operation Now on 4-Day Week

Production Cut to 12,000 Tires Daily—Tire Surplus Placed at 6,000,000

AKRON, Oct. 18—Although tire and tube departments of the Goodyear Tire & Rubber Co. were closed down Thursday night until Monday morning under a new four-day-a-week basis of operation, which became effective Oct. 15 under the company's retrenchment policy, business men and industrial leaders in Akron refuse to view the company's move or the general tire industrial situation with any degree of alarm.

Steady falling off of sales due to the tightness of money and the apparent hold-back attitude of buyers in anticipation of tire price reductions which manufacturers say cannot come for some time, necessitated reducing Goodyear production from 16,000 tires daily to 12,000. The matter of further reducing factory forces was placed before the Goodyear Industrial Republic Legislators of the House and Senate choosing the alternative suggested of putting all tire production on a four-day basis rather than laying off several thousand more men.

Other rubber companies are slowing down similarly, although definite announcements of force reductions or reduced schedules are not forthcoming.

Despite the situation Akron business men and industrial leaders viewed the matter with optimism for the first time since the beginning of the business slump. While competent authorities of rubber companies announced that the present tire surplus in the United States did not exceed 6,000,000 tires the impression has existed that the surplus was more than double this amount. Careful surveys of dealers' supplies and stocks stored in Akron and in warehouses throughout the country have brought the figure down very close to 6,000,000. With over 7,000,000 motor cars operating in the United States, necessitating 28,000,000 tires for full equipment, should every motorist in America buy one new tire a shortage of tires would arise.

Surplus Very Near Normal

It is pointed out this is taken to mean that the present surplus is very little if any above normal. Tire concerns are adopting the policy of further reducing production to keep within current sales so as not to increase this surplus any more than necessary.

The Goodyear factories will shut down the week of Oct. 25 for annual inventory, closing the current fiscal year.

Missouri Industry Grows 478 Per Cent

Product for 1917 Shows Value of
\$84,114,761 — Employed
10,554 Workers

ST. LOUIS, Oct. 18—The vehicle trade in Missouri has shown a gain of 478 per cent in the last five years, according to a bulletin just issued by the Bureau of Labor Statistics at Jefferson City. The total factory output of the manufacturing, assembling, reconstruction and repair work of motor cars, trucks, carriages, wagons, buggies and all other vehicles in 1919 was \$84,114,761, as against \$17,591,023 in 1914. These figures include the total value of all vehicle bodies, tops, accessories and supplies.

The combined vehicle industry in 1919 employed 10,554 salaried and wage-earning men and women, who got \$9,981,274 as compared with 6635 employees who got \$5,031,955 in 1914. The capital invested in 1914 was \$10,229,797 and in 1919 it was \$19,612,527.

Concerning the industry of Missouri in 1919, the bulletin says:

"The motor cars and power trucks manufactured, assembled and reconstructed in Missouri in 1919 alone had a total worth of \$62,203,177. This branch of the State's vehicle industry gave employment to 2910 workers that year, 2803 being men and youths and 107 women and girls. They drew \$2,932,911 for their 1919 services. The capital invested in 1919 in this division of the vehicle industry was \$7,480,120.

"The worth of power trucks and motor cars manufactured, assembled and reconstructed in St. Louis in 1919 was \$37,987,874. These establishments employed 2239 workers, divided between 2136 men and youths and 103 women and girls, whose wages and salaries totaled \$1,821,370. The capital invested in these St. Louis plants totaled \$5,134,675.

"The worth of manufacturing, assembling and reconstructing motor cars and trucks in Kansas City in 1919 reached \$24,215,303. The establishments considered employed 671 workers, of whom four were women, and this force that year drew \$1,111,541 in wages and salaries.

"Missouri manufacturing in 1919, including bodies, tops, accessories, and supplies for motor cars, trucks, carriages, wagons and buggies, had a total worth \$6,613,747 and gave employment to 1894 workers, divided among 1828 males and 66 females. They drew \$1,954,217 in wages and salaries."

STROMBERG TO DROP PRICES

NEW YORK, Oct. 18—The Stromberg Motor Devices Co. is contemplating a reduction in its prices just as soon as business becomes normal. Production at the present time has been reduced to approximately 20 per cent of normal, due to the many stops on deliveries received from customers. Labor is extremely high, being approximately 80 per cent of cost.

INDUSTRY'S CREDIT WEAK UNTIL SPRING

CHICAGO, Oct. 18—Discussing the outlook for the automotive industry, Ralph Van Vechten, vice-president of the Continental & Commercial Bank, which has undertaken a large share of the financing of the Goodyear Tire & Rubber Co., said:

"The automobile industry must wait until general liquidation reaches a point where the credit situation is relieved, which probably will take most of the winter. I wouldn't be surprised to see some improvement in the early spring and once it starts there should be rapid recovery, culminating in a considerable rush all around and greater prosperity than the automobile industry ever had. Large manufacturers realize banking necessities and are co-operating.

Gear Makers to Study Standards and Costs

NEW YORK, Oct. 18—Standardization and costs will be the principal subjects discussed at the semi-annual meeting of the American Gear Manufacturers Association, which will be held at Monhok Lake, N. Y., Oct. 27, 28 and 29.

Among the speakers will be P. G. Agnew, secretary of the American Engineering Standards Committee, whose subject will be "Standardization from the Point of View of the American Engineering Standards Committee"; Calvin W. Rice, secretary of the American Society of Mechanical Engineers, who will speak on "Standardization"; C. L. Colless, II, president of the Reliance Electric and Engineering Co. and past president of the Electric Power Club, whose subject will be "Industry Organization"; and Christopher Haigh, supervisor of costs, General Electric Co., who will describe the "Machine Rate Method of Distributing Expense."

At an informal banquet to be held Thursday night, Oct. 28, Charles W. Woodward, vice-president in charge of personnel for the Hydraulic Pressed Steel Co., will be the principal speaker of the evening, taking as his subject "The Human Element in Industry."

NEW COMPANY TO MAKE PARTS

JOHNSTOWN, PA., Oct. 14—The American Steel Products Co., of this city, recently organized with a capital stock of \$300,000, has purchased the foundry of J. V. Hughes & Co. at New Florence, Pa., and has begun operating its new plant. A two-story structure adjoining the foundry also has been taken over by the concern and is being remodeled and equipped with modern machinery for the manufacture of automobile accessories, steel and aluminum articles. The force of employees will be greatly increased.

Directors Close Fort Wayne Tire

Allege Mismanagement by Officers in Petition—Bank Is
Named Receiver

FORT WAYNE, Ind., Oct. 18—The Lincoln Trust Co., of this city, has taken charge of the plant and records of the Fort Wayne Tire & Rubber Mfg. Co. as receiver, following the petition for the appointment of a receiver filed by Louis R. Welker, a director in the concern, and Edward E. Engler and Morton E. Andrews, stockholders. Judge Wood, of the Allen county circuit court, fixed the company's bond at \$450,000.

The allegations in the complaint are rather sensational. One of the most sensational of the features is a statement that at the first meeting of the board of directors the board entered into a contract with John C. Brown, president of the defendant company, and Louis E. Kraft, secretary of the company, whereby they were commissioned to handle the sale of the company's stock for fifty per cent of the money received.

It is alleged that for their services in this capacity they have already received \$375,000 and claim the sum of \$90,000 is still due them. It is also charged that Brown and Kraft sold to the defendant company patents and formulas for use in the conduct of the business, receiving in exchange 10,250 shares of stock in the company worth \$102,500 at face value.

It is further charged that a financial statement which is said to have been used in selling stock does not represent the true condition of the company. According to this statement the company has a surplus of \$28,747.88, but the charge is made in the complaint that there is no surplus and that the company is insolvent to the sum of \$450,000. It is further alleged that since production was started at the plant on March 1, of this year, the plant has been run at an actual loss of \$35,000 to \$40,000.

UNIVERSAL TO BUY DOMAN

SANDUSKY, OHIO, Oct. 16—Universal Products Co., this city, will increase its capital to \$500,000 and with the proceeds plans to purchase the H. C. Doman Co. of Oshkosh, Wis. The main offices will be moved to Oshkosh.

The new company will continue to manufacture the Universal electric lighting and power plans and the Doman marine engines. The officers of the new company will be L. E. Willson, president; R. K. Schriber, vice-president; Charles H. Eichinger, secretary, and Louis Schriber, treasurer.

ROWE PURCHASES LANCASTER

LANCASTER, PA., Oct. 18—The plant and assets of the Lancaster Body Co. has been purchased by the Rowe Motor Mfg. Co., who will operate it as their body department.

Special Cables

Italian Factories on 60 Per Cent Basis

New Control Still Largely Experimental—France Continues Surplus Army Sales

(By Cable to AUTOMOTIVE INDUSTRIES)

PARIS, Oct. 19—Work has been resumed in the Italian automobile factories in which operations were suspended while the revolutionary strike was in progress. Production is said to be running at about 60 per cent normal. The extremist element of the workers claim that under the 14 points of the charter they have outlined for their share in the operation of industry, under the agreement with employers fostered by the government, they exercise a control over the plants which amounts practically to an equal partnership with the owners.

Although work is proceeding, there has been no clear interpretation of the agreement regarding shop control. If the men interpret it merely as control by them over shop conditions permanent peace can be established, but if the workers claim the right to purchase raw materials and enter into contracts, the owners contend a disaster will follow.

As a solution to the present state of affairs, President Agnelli of the Fiat company offered to sell the entire company to the co-operative workers. After considering the proposal, however, the men declined the offer, declaring they did not consider it genuine although there was every reason to believe it bona fide.

Extremists wish to obtain possession of the Fiat and other factories by force. The moderates have no desire to enter upon such an undertaking as running a factory employing 25,000 workers. The work which was done while the strike was in progress was of no practical value, for there were no engineers or office staff in the plants. Consequently all factories are more than one month behind in deliveries.

Army Automobiles in Demand

Emanuel Brousse, liquidator of the French army stocks, replying to automobile manufacturers who have asked that no more sales of army automobiles be permitted in France, says no attention can be paid to such a project. He asserts that the requirements of the public must be met and that since cheap automobiles are required the sales must go on. He points out that it would be impossible to call off such sales under any

circumstances because the French government has no means of guarding or storing army motor cars and supplies. Entire parks have been sold to dealers and will be offered to the public this week. Attempts to sell French army automobiles abroad have not been successful. A considerable number of cars, chiefly Cadillacs and Marmons, were sent to Spain but not a single one has been sold.

Standard Oil Enters France

Brousse insists the manufacturers themselves are largely to blame for present conditions because they have specialized in high grade cars instead of low priced machines and have increased their price needlessly. The high cost of gasoline also has contributed to the present crisis. France is much interested in the proposed formation of a Franco-American Standard Oil Company, in which the Banque de Paris et Pay Bas will hold 50 per cent of the stock. A branch of the Standard Oil Co., known as the Economic Co., formed some months ago, has large stores of oil in the suburbs of Paris. It appears to be the intention of the Franco-American Co. to dispose of these stocks and enter into competition with existing firms. The retail price can be reduced by modern methods of distribution.

BRADLEY.

Competition Develops for Spanish Trade

WASHINGTON, Oct. 16—European manufacturers of automobile accessories are making strenuous efforts to oust American competition from Spanish markets through a revival of their old-time policy of granting liberal credit terms. Retailers in Spanish cities give from one to three months' credit to known customers.

The American consul at Seville has advised an American manufacturer that the market for automobile supplies is very favorable despite this new competition from European makers of accessories. The great need of the dealers in Spain is the development of salesmanship. The majority of dealers have a limited knowledge of the mechanical features of their products. It is urged that American manufacturers enclose instruction in Spanish as well as in English. The motor car owners in Spain are generally wealthy and afford excellent prospects for energetic dealers. It has been suggested that American producers urge their agents to develop the advertising field, for the Spanish people are quick to see the advantages of automobile appliances.

THOMAS MAKES CLIMB RECORD

PARIS, Oct. 12 (By Cable)—Rene Thomas, driving a 450 hp. Sunbeam car, established a new record to-day in the Gaillon kilometre hill climbing record. His speed was at the rate of 108 m.p.h.

Embargo Not Answer to French Problem

Manufacturers Feel Lower Taxes and Reduction in Fuel Costs More Necessary

PARIS, Oct. 10—(Special Correspondence.)—The appeal of the Chambre Syndicale of Automobile Manufacturers to the Government that an embargo be placed on automobile imports has not met with anything like a unanimous response from French makers, and it is now obvious that this move was made by a small group in the Chambre Syndicale who did not in any way represent the majority of the industry. There is a unanimous feeling, however, that the luxury tax should be removed from automobiles of less than a given power or given initial cost, that taxes be reduced, and that means should be found to reduce the present excessive cost of gasoline, which now is \$2 to \$2.50 per gallon.

While the selling price of automobiles has only increased by a little more than 100 per cent since the war, gasoline has increased 700 per cent, taxes have gone up 200 per cent and garage charges and odd labor have gone up at least 500 per cent. Clients generally were willing to pay the increased purchase price, but the excessive state taxes and operating costs proved to be the last straw which provoked the present crisis.

Delage, who immediately after the war announced that his entire factory would be devoted to the production of a high-class six-cylinder car, is just about to market a medium priced four-cylinder model in addition. Delage was more favorably situated than any of the others, for he was immediately in production at the close of the war and delivered large numbers of post-war cars at a time when other makers were either delivering nothing or only offering a pre-war type.

The demand for costly cars has decreased so much during the last few months that Delage has found it necessary to take up again a modification of the four-cylinder type he built before the war, in order to keep his factory operating on an economical basis.

LAUSON WINS BRITISH TRIALS

NEW HOLSTEIN, WIS., Oct. 16—The John Lauson Mfg. Co. has received a cable message from England announcing that the Lauson tractor won the first prize at the Lincoln trials in competition with a large number of machines of foreign make. The prize consisted of a gold medal and \$100 in cash. Some of the tests to which the tractors were subjected were: Hauling direct in work or on the road, driving barn machinery, plowing under various conditions with especial attention to compression of land by the machines, space and time occupied in turning, together with mechanical perfection, economy and price.

Exports of Automobiles and Tires for August

Automobiles														
COUNTRIES	Commercial				Passenger				Parts	Automobile Tires				All other tires
	Complete Cars		Chassis		Complete Cars		Chassis			Casings	Inner tubes	Solid tires		
	Number	Dollars	Number	Dollars	Number	Dollars	Number	Dollars		Dollars	Dollars	Dollars	Dollars	
Europe:														
Austria					3	3,000				3,200	100			
Azores and Madeira Islands					106	165,829	1	3,686	6,375	68,004	10,354			
Belgium	2	3,957			59	97,175	1	400	216,840	94,689	6,393	1,398	7,471	
Denmark	40	73,936	6	7,859	4	16,000			30,162	19,683	84	20,987		
France	1	8,000							100	30,189	10,016			
Germany					2	2,790								
Gibraltar					13	17,808			4,491	13,545	4,708			
Greece					1	779								
Iceland and Faroe Islands					72	83,223	54	56,577	38,322	45,804	6,435			
Italy					9	9,277				343	8			
Malta, Gozo, and Cyprus Is.					32	24,256	12	20,196	174	252,351	7,113	1,033		
Netherlands	32	24,256	12	20,196	406	507,849	2	3,234	55,228	50,347	2,208	15,675		
Norway	72	71,301	49	89,277	406	507,849			4,688	38,719	2,290	150		
Portugal			2	5,200	5	16,538			730	117,952	580			
Roumania	15	54,228			2	4,500			505,317	126,232	15,268	24,782	497	
Spain	14	31,513	3	5,159	325	496,936	1	1,030	42,208	167,746	25,880	12,365	2,397	
Sweden	21	51,077	18	34,778	369	507,301	11	11,220	5,484	37,127	6,017			
Switzerland	5	2,640			73	60,073			1,276	3,351	461			
Turkey in Europe					3	3,220			2,193,925	279,906	16,444	6,416	3,927	
England	99	148,681	159	210,583	1,815	1,998,323	172	161,592	128	5,356	191		597	
Scotland			58	54,900	16	20,342	12	10,702	974					
Ireland	2	3,403			49	58,308			48	578	118			
Jugoslavia, Albania, etc.														
North and South America:														
British Honduras	1	1,988	1	495	4	2,396			1,182	772	256		43	
Canada	40	82,586	80	172,189	454	658,844	59	62,546	1,448,090	212,148	25,162	17,259	5,983	
Costa Rica	1	2,900	2	3,579	1	2,000			849	850	16			
Guatemala			1	438	4	8,600			1,797	30		218		
Honduras					3	2,485			1,947	864	24	593		
Nicaragua			1	3,429	12	18,488			821	1,290	230			
Panama					7	10,601			12,024	96,824	12,706	546	63	
Salvador	1	2,150	4	13,599	3	9,351			4,733	283	66	484		
Mexico	84	112,219	8	23,607	407	356,295	2	612	77,993	79,540	11,860	5,298	2,813	
Newfoundland and Labrador	2	12,725	2	6,130	9	14,863			4,382	3,236	508	291	748	
Barbados					20	20,500			1,319	138	8			
Jamaica	3	4,963	5	13,120	29	44,087			5,461	2,463	59		136	
Trinidad and Tobago	12	29,197	6	14,542	66	61,313			24,674	10,607	824		474	
Other British West Indies	3	1,140			24	16,363			2,856	3,561	405	262	55	
Cuba	56	165,778	26	75,252	363	456,983	1	1,500	73,418	270,073	24,007	41,259	1,305	
Virgin Islands of U. S.					10	7,283			1,328	3,454	772		54	
Dutch West Indies					2	1,299			187	2,579	3,413		67	
French West Indies			5	4,481	19	17,019			2,958	1,120	5	1,030		
Haiti	2	4,919	6	22,875	25	23,000			2,980	10,445	1,784		85	
Dominican Republic	4	7,240	8	18,261	44	91,582			15,027	23,104	3,667	1,512	2,755	
Argentina			6	16,573	303	527,062			484,860	169,349	26,4		7,757	
Bolivia									2,642	697	410			
Brazil	75	69,958	65	49,065	307	467,029	16	9,660	117,813	189,740	9,886	29,955	56	
Chile	41	34,714	3	3,245	32	52,196			19,566	8,589	1,828	6,152		
Colombia	24	20,260			69	73,477			21,796	10,929	1,451		440	
Ecuador	1	1,929	1	2,240	26	32,776			5,495	11,551	745			
British Guiana					17	12,910			4,389	11,428	354	505		
Dutch Guiana					1	1,820			568					
Paraguay									188					
Peru	61	45,535	53	33,242	37	40,740			23,842	14,060	1,923	1,470		
Uruguay	4	5,967	3	11,600	415	362,127			55,774	22,888	5,378	700		
Venezuela			1	5,270	14	16,366			8,878	24,344	2,817		504	
Far East and Asia:														
Aden					21	18,244			1,492	5,570	931			
China			4	2,400	111	148,075	35	26,745	25,653	3,039	366		31	
Kwantung, leased territory									190					
Chosen					1	3,452			5,039	64				
British India	141	272,895	52	88,667	1,368	1,521,697	18	46,210	83,328	82,117	6,889	2,294	646	
Straits Settlements	15	28,909	33	66,880	244	298,013			22,354	76,239	4,725	2,000	61	
Other British East Indies	2	3,550	6	12,128	29	30,709			2,440	2,968	672			
Dutch East Indies	44	128,284	61	147,700	369	619,125	19	52,923	58,727	78,128	8,421	45,402	2,170	
French Indo China			11	10,372	60	67,541			636			638		
Hongkong					14	18,995			3,279	2,900				
Japan	10	21,420	43	75,234	58	115,772	36	51,056	41,834	50,971	6,742	3,985	8,103	
Persia									114					
Russia in Asia									59		449			
Siam									454				30	
Turkey in Asia	1	3,061	10	4,950	107	101,031			1,767	3,549	558			
Australia	35	59,834	49	80,263	243	292,553	375	390,615	74,898	12,780	3,211	1,000		
New Zealand	22	48,489	9	25,093	526	771,811	6	8,298	58,111	85,573	4,946	6,200	3,169	
Other British Oceania					2	2,148								
French Oceania										96	18		70	
Philippine Islands	35	82,270	66	113,808	311	410,122	1	3,500	32,842	80,146	4,933	13,028	1,410	
Africa:														
British West Africa			12	14,007	4	4,359			1,643					
British South Africa	4	3,658	24	42,517	336	413,476	4	6,408	115,406	287,631	29,681	895		
British East Africa			1	4,500	36	37,782			2,993	13,657	2,202			
Canary Islands					14	11,933			2,185	707	35	800		
French Africa									3,273					
Liberia			2	1,156										
Morocco									1,390					
Portuguese Africa					59	75,179			2,738	21,386	5,357		14	
Egypt	21	18,111	3	5,400	183	187,719			12,112	17,169	1,422			
Total	1,054	1,759,004	980	1,616,259	10,329	12,881,213	826	908,514	6,115,902	3,121,530	327,009	265,549	53,931	

Exports of Automobiles, Airplanes, Trucks, Farm Tractors, Motorcycles and Parts for August and Seven Previous Months

	August 1919		August 1920		Eight Months Ending Aug. 31, 1919		Eight Months Ending Aug. 31, 1920	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes					11	\$85,500	41	\$381,204
Airplane parts		\$3,973		\$2,120		3,093 358		507,358
Commercial cars	1,282	2,616,781	2,034	3,375,263	9,707	23,386,333	20,363	31,548,537
Motorcycles	2,012	548,163	1,365	397,221	14,279	3,848,452	24,738	6,706,170
Passenger cars	6,283	6,855,277	11,155	13,789,727	37,908	41,985,322	99,795	111,848,789
Parts, not including engines and tires		3,193,431		6,115,902		25,833,740		55,112,892

Engine Exports

	August 1919		August 1920		Eight Months Ending Aug. 31, 1919		Eight Months Ending Aug. 31, 1920	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobile, gas.	3,050	\$465,419	2,067	\$327,142	18,652	\$2,926,149	27,061	\$4,386,000
Marine, gas.	1,249	394,855	505	162,746	8,105	3,478,585	6,971	2,206,442
Stationary, gas.	2,042	309,466	2,158	511,701	16,323	2,470,917	19,688	3,568,283
Tractor, gas.	1,624	1,508,608	1,497	1,122,940	14,585	14,729,210	15,305	14,669,216
Total	7,965	\$2,677,808	6,227	\$2,124,529	57,665	\$23,604,861	69,025	\$24,829,941

Tractor Engine Exports for August

Countries	Gasoline		Steam		Kerosene	
	Number	Dollars	Number	Dollars	Number	Dollars
Belgium	20	8,020	...	...	...	...
Denmark	4	4,965	...	...	...	...
Finland	3	3,320	...	...	1	1,770
France	74	61,158	...	...	...	...
Greece	1	885	...	...	...	...
Italy	...	...	18	17,100	16	15,200
Norway	3	1,882	...	...	...	...
Spain	35	47,655	...	...	...	...
Sweden	50	66,310	...	...	27	35,803
England	127	65,286	...	...	143	92,337
Canada	750	288,982	6	6,783	166	173,363
Costa Rica	2	1,185	...	...	...	...
Guatemala	3	3,568	...	...	...	...
Honduras	2	5,318	...	...	...	...
Nicaragua	1	4,725	...	...	...	...
Mexico	15	65,632	4	15,709	6	8,010
Cuba	24	29,709	...	...	58	68,676
French West Indies	1	912	...	...	...	...
Dominican Republic	4	18,020	...	...	...	...
Argentina	47	42,310	...	...	20	28,000
Brazil	27	31,151	...	...	1	1,930
Chile	2	2,952	...	...	...	...
Colombia	2	1,886	2	7,908	...	...
Ecuador	1	1,500	...	...	1	1,001
Dutch Guiana	2	2,545	...	...	4	17,000
Peru	5	5,121	...	...	...	...
Uruguay	10	14,871	...	...	3	4,561
China	6	16,615	...	...	...	...
British India	21	31,915	12	66,748	12	11,134
Straits Settlements	7	15,145	1	5,685	...	...
Dutch East Indies	14	16,074	...	...	...	...
Japan	6	4,434	...	...	...	...
Australia	62	50,180	...	...	40	23,998
New Zealand	47	71,531	...	...	2	1,928
Philippine Islands	85	105,461	8	9,959	4	3,253
British South Africa	6	11,223	...	...	...	...
British East Africa	5	3,825	...	...	...	...
Portuguese Africa	4	8,400	...	...	...	...
Egypt	10	8,369	...	...	2	3,560
Total	1,497	1,122,940	51	129,982	506	491,524

CAR IMPORTS, \$603,203

WASHINGTON, Oct. 15—Records of the Bureau of Foreign and Domestic Commerce made public this week show that 399 automobiles valued at \$323,821 were imported into this country during August. This unusual volume for a single month brings the total for eight months up to 545 cars valued at \$603,203. The statistics fail to disclose the actual number of re-shipments.

For the first eight months of 1919 the 57 cars imported were valued at \$27,003. The automobile parts, except tires, showed the same remarkable growth in imports. For the period, Jan. 1 to Aug.

31, the parts were valued at \$750,360, as against \$46,483 for the corresponding period last year. The August returns giving a valuation of \$108,940, as compared with \$19,316 for August, 1919.

GREECE MARKET FOR BIG CARS

WASHINGTON, Oct. 15—Trade Commissioner George Wyeth has cabled the Department of Commerce that Greece affords an excellent market for high priced automobiles. The surplus army stocks prevent a corresponding demand for motor trucks. Commissioner Wyeth was recently assigned to the Near East and is making a study of markets.

**French Car Exports
Gain \$139,617,200**

Total for First Eight Months of Year \$150,342,400—Imports Drop \$19,800,000

PARIS, Oct. 1 (*Special Correspondence*)—French automotive exports are increasing rapidly, as shown by the returns of the Ministry of Commerce, just issued for the first eight months of the present year. During this period France exported automotive goods to the value of \$150,342,400, being an increase of \$139,617,200 on the corresponding period for 1919. The biggest single item was for passenger cars, which totaled \$2,582,000, trucks coming second in importance and airplanes third. Automobile tires are not given in the official figures, although big business has been done in this branch of the industry.

During the same period automotive imports have dropped by \$19,800,000. Trucks are the biggest single item, bicycles coming second and passenger cars third. The motor boat item is largely made up of temporary importation of boats for the Monaco boat races last spring.

The following are the official figures for the first eight months of 1919 and 1920:

FRENCH EXPORTS FOR FIRST EIGHT MONTHS OF:

	1919	1920
Automobiles	\$4,020,000	\$100,459,200
Automobile Trucks	2,582,000	41,335,000
Automobile Bodies	109,600	601,000
Motor Cycles	49,400	462,000
Bicycles with Tires	861,600	2,613,800
Airplanes	2,747,200	4,129,000
Flying Boats	106,000	156,200
Motor Boats	6,600	345,800
Spherical Balloons	142,800	140,400
Airships	...	100,000
Total	10,625,200	150,342,400

FRENCH IMPORTS FOR FIRST EIGHT MONTHS OF:

	1919	1920
Automobiles	\$4,561,400	\$2,364,000
Automobile Trucks	50,052,200	32,713,400
Automobile Bodies	1,065,200	1,129,400
Motor Cycles	832,200	233,200
Bicycles with Tires	1,122,800	2,876,600
Airplanes	497,800	3,800
Flying Boats	58,000	...
Motor Boats	17,200	86,400
Total	58,206,800	39,406,800

PUSH TRACTOR SALES ABROAD

SPRINGFIELD, MASS., Oct. 16—Sale of the "New Britain" tractor, product of the New Britain Machine Co. of New Britain, Conn., is to be pushed in the European market, a shipment having already been sent to England. I. W. Hawes of the corporation's tractor department has arranged to be in England and France for several months to take personal charge of placement of the tractors and to complete the establishment of business relations between the company and the foreign trade.

Truck Demonstrates Long-Haul Ability

**Duplex Stock Model Goes 935
Miles in 24 Hour Test at
Indianapolis**

INDIANAPOLIS, Oct. 19—A unique test has been completed on the Speedway here to determine the ability of a 1½-ton truck equipped with pneumatic tires for long distance express hauling. The truck, manufactured by the Duplex Motor Truck Co., Lansing, Mich., was loaded with ballast and operated continuously for 24 hr. without stop. A special gasoline supply was mounted in the truck body so as to provide sufficient fuel for the 24 hr. run, and the oil was fed from the gas tank ordinarily used for gasoline. The truck, which was otherwise a stock model, negotiated 935 miles in the 24 hr., an average speed in excess of 38 miles per hr. The truck was not stopped during the entire run; in fact, did not slow down below 35 miles per hr.

The test was watched with great interest by a great many of the manufacturers who furnish parts for this truck. It is equipped with a Hinkley 4 by 5¼ engine, Firestone pneumatic cord tires, Stromberg carbureter, Champion spark plugs, Westinghouse starting, lighting and ignition; Sheldon axle, front and rear, with Hess Bright bearings; Covert transmission, Johns-Manville speedometer, Peters universal, Prest-O-Lite battery and Ross steering gear. The truck weighed in at the start of the run at 8300 lb., of which approximately 3300 lb. represented pay load and gasoline. The timing was done by chronometer, a record being taken of the time on each lap. The speed remained remarkably constant, being at no time below 35 miles and at no time above 42 during the 24 hr. run. At the conclusion of the run, and without stopping the truck, one lap of the speedway was made in 3 min. 26 2/5 sec., or at about 44.5 miles per hr.

The industry is particularly interested in this test because of the fact that the Indianapolis Speedway is in no better condition at the present time than the average hard surface road. As a matter of fact, at one place there is a temporary bridge structure over which the truck had to pass, due to the fact that some repairs are being made to a portion of the track. This demonstration, therefore, is illustrative of what could be done with properly policed highways and with the right-of-way given to through trucks mounted on pneumatic tires and adapted for high speed running.

MICHIGAN PLANS SNOW FIGHT

DETROIT, Oct. 15—Highway department heads throughout the State are preparing a drive on snow in the effort to keep Michigan trunk roads in condition for travel throughout the winter. The State Highway Department, which

is supervising the work, has at hand a number of tractors and rotary snow plows with which the work will be performed. With the first fall of snow active work will be begun and will be continued throughout the winter.

The railway congestion, in the opinion of highway men, makes it imperative that the roads be kept open for truck transportation between cities and towns which heretofore has been prevented by reason of heavy snows.

Freight Revolution Seen by Truck Use

SEATTLE, Oct. 18—That the employment of the motor truck and the demountable closed automobile truck body, such as accomplished with such favorable results at Cincinnati, will revolutionize methods of handling freight at all railroad transfer points in the United States, was the consensus of delegates at the annual convention of the Association of Port Authorities of the Pacific Coast, held in Seattle. It was declared by several speakers, however, that there are still many knotty problems to be solved before the same system can be successfully invoked at marine terminals.

If standardized unit containers could be loaded with markings segregated in the ship's hold at the foreign port, and the same containers lifted out of the hold of the vessel on arrival and placed either on motor truck bodies or railroad freight cars, then this system would be an ideal arrangement, said the delegates, but it was stated that these containers cannot be used for the heavy export trade, such as steel, iron and lumber, and the shipper at the foreign port is unwilling to go to the additional expense of segregating the freight and loading it into the containers.

The motor truck and the demountable closed auto truck body may be found very effective, however, at marine terminals, it was suggested, in the handling of strictly intercoastal cargoes.

STATE ROAD OFFICERS TO MEET

WASHINGTON, Oct. 18—A highway program for 1921 will be one of the chief topics at the annual meeting of the American Association of State Highway Officials which will be held here in December. Owing to the demand for accommodations during the first week when Congress meets, the committee in charge of the convention have set Dec. 13 as the tentative date. The sessions will continue for four days.

KELLY TRUCK PLANT CLOSES

SPRINGFIELD, OHIO, Oct. 18—The Kelly-Springfield Motor Truck Co., which normally employs about 800 men, has closed its plant for an indefinite period. President James L. Geddes states that the company has many trucks on hand but owing to general business and financial conditions has been unable to dispose of them as rapidly as it expected. He said the plant would be closed until conditions improved.

Manufacturers See End of Depression

**Parts Makers Inventories Make
Situation Difficult—Plenty of
Money for Industry**

(Continued from page 836)

the full effect of the slump in the automotive field. Away back in May and June the distributors and dealers, the outposts of the industry, began to sense a slackening of demand. It took weeks for this slump to work back to the car manufacturer. Now the parts and accessory manufacturers are feeling the full force of the blow. At the same time business is beginning to pick up a bit here and there in the field. The pendulum is starting slowly its backward swing.

Like the car manufacturers many of the parts makers have large and unbalanced inventories and they are finding it even more difficult than the car manufacturers to get cash to meet their bills. They have suffered severely from cancellations and losses on goods in process which prospective purchasers have been unable to take. There will be failures in this field just as in the car making end but they will be no more significant. The companies which are solidly built will get through.

Much satisfaction is to be found in the fact that there have been few cases of bankruptcy in the automotive industry. There are mighty few companies in receivership which are insolvent. Nearly all of them are the victims of circumstances. With good luck most of them will pay all their bills and stay in the field with good prospects for future prosperity when the tide turns as it inevitably will.

Another good omen is the ease with which many companies are refinancing. This proves that there is plenty of money in the country and the fact that automotive securities are being absorbed by the investing public shows that the people have faith in the industry. Banks are underwriting many of these issues and bankers usually are canny persons. Even Wall Street, which is more temperamental than a prima donna or a poet, has come to the conclusion that it has been too ready to sell short on the industry and it is stuffing cotton in its ears when the professional scandal monger comes around.

Production Near Rock-bottom

Altogether there is less reason for pessimism than there has been at any time in the last six months. Production is getting down to a rock bottom basis, expensive and unbalanced inventories are being worked up, overhead is being reduced and labor efficiency is increasing. It is highly probable that an energetic aggressive sales campaign would liquidate within sixty days the accumulated stocks of finished products. Best of all, more normal conditions are being restored rapidly in the country as a whole.

Accessories to Meet Big Demand in 1921

Hardware Jobbers Confident Normal Times Will Be Restored— Discuss Tires and Discounts

ATLANTIC CITY, Oct. 19—Nineteen twenty-one will be the biggest business year in the history of automotive equipment, in the opinion of hardware jobbers from all sections of the country, who met here to-day at the annual convention of the automobile accessories branch of the National Hardware Association. The prediction was based on the tremendous production and sale of automobiles in the first half of the current year and on expectations almost unanimously expressed by heads of jobbing firms which have been in existence half a century or upwards, that the country will be back on a normal business basis by the new year.

Manufacturers in attendance also spoke optimistically, several announcing extensions of production facilities to meet what they termed an almost certain demand, in view of the rapid approach of automobile registration to the ten million mark.

The tire business came in for severe criticism and objections were raised also to sliding discounts on several lines of accessories. Tire manufacturers were criticised for maintaining the guarantee and adjustment policy, for cut-rate sales and for extravagance in the organization of branch house systems. Several speakers declared they were through with the tire business because of the losses and annoyances caused by handling adjustments. Several others condemned the quantity sales to department stores and fly-by-night dealers at prices which permitted retailing of tires at rates below wholesale figures. Still others declared that "an orgy of establishing tire branch houses" had contributed to the high cost of tires and to the fixing of jobbers' discounts so low that the business had lost its attractiveness for the wholesaler.

Tire Situation Uncertain

Manufacturers' representatives present blamed the cold spring and the general slowing up in business for the condition of over-production in the tire business. It was stated that the surplus over the normal stock of tires had been reduced 60 per cent since July 1 and that the situation would be "well in hand" by Jan. 1. The convention was left in an uncertain state of mind when one manufacturer predicted a reduction in tire prices of 15 per cent with smaller margins of profits all along the line while another said that his company, one of the largest, was "seriously considering" longer discounts.

The jobbers generally expressed satisfaction with discounts on accessories but condemned sliding discounts, which they declared invited over-stocking of merchandise. There was an insistent demand for a return to the 2 per cent discount for cash within thirty days on invoices,

TIMES NOT ABNORMAL TO GOOD BUSINESS MEN

DETROIT, Oct. 18—A spirit of optimism to combat the business slump is urged by manufacturers, the attitude being summed up concisely in a communication addressed to his organization by H. M. Lee, president of the Duplex Truck Co. of Lansing.

Conditions are not abnormal in the opinion of Lee but are the inevitable result of all wars and can be overcome by the business man who has his house in order and sticks to his guns.

"A lot of persons realized during the era of extravagance that conditions were too good to last and set about figuring on what they would do when it came time to earn their living again," said Lee. "Others carried away by the wave of prosperity lost their heads and it is perfectly true that some American business men did not have time to save their money or even to save time. They were too busy filling orders or trying to boost production to keep up with what they presumed would be an unending stream of orders.

"There are always those business men who wait to feel the effects of a condition before taking any steps to see it through and a considerable number of them go to make up the compilations of 'business failures.' Others limp through and come out older and wiser. There is still another class which takes advantage of the prosperous seasons to set their houses in order for closer figuring before they have to do it. They are the ones who are never so hard hit by so-called curtailment.

"Business to-day, whether buying or selling demands a high type of foresight, courage and business skill and conditions as they are to-day test the quality of management. On the whole American business will come through triumphant. There will be merely a relative change in the standing of some companies. It is no time for impatience or discouragement but rather a time for cleaning house, for casting out needless expense, for cutting wasteful overhead, for eliminating the unnecessary and for putting business back on the bedrock of common sense"

a concession abandoned during the war by many manufacturers, and several telegrams from producers announcing resumption of the practice were cheered.

The hardware men made a move for closer association with the automotive equipment jobbers by deciding to invite sixty of the latter firms to send buyers to the accessories exhibit at St. Louis Nov. 30-Dec. 3.

Segregate Sessions at Service Meeting

Passenger Car and Truck Men to Take Up Problems of Each Vehicle Class

NEW YORK, Oct. 18—Factory service managers representing company members of the National Automobile Chamber of Commerce will hold their convention Nov. 9, 10 and 11 at the Hotel Cleveland, Cleveland. In the past these meetings have been open to all who were interested in service and who wished to attend, but this meeting will be open to factory service managers only. The first two days will be devoted to the discussion of service problems and the third day will be given over, as usual, to the inspection of local establishments. An innovation at this convention will be the segregation of truck and passenger car subjects so that truck managers who are not so much interested in passenger car problems will be able to use the time to other advantage. The following program has been laid out by the service committee:

Tuesday morning—Address of welcome, Report of Service Committee, Uniform Code of Driver Signals, Better Instruction and Parts Books, Possibilities of Increasing the Usefulness of the Service Bulletin.

Tuesday afternoon—How to Improve Passenger Car Service, Special Tools for Distributors, How Factories Can Advise Dealers as to Service Station Layouts, Factory Responsibility in Connection with Claims on Equipment Not Covered by Warranty.

Wednesday morning—The Ideal Factory Service Department as to Organization and Personnel and Systems in Handling Parts Orders, Questions for Discussions—Should Amount of Parts Carried by Distributors be Fixed by Factory? What Is the Best Way to Systematize Handling of Back Orders? How Far Should the Factory Go in Helping Dealers Train Personnel? Should Factories Furnish Parts in Territories Where Parts Makers Have Service Stations? How Can Service Departments Aid Recovery of Stolen Cars? In What Direction Might Greater Co-operation With Parts Manufacturers Be Effected?

This will be the third convention of service managers since the war, the first having been held at Cleveland last November, and the second at Indianapolis in May.

PONTIAC FACTORIES CLOSE

PONTIAC, MICH., Oct. 18—Except at the plant of the General Motors Truck Co. conditions in the automobile field in this city are not satisfactory. The Oakland Motor Car Co. plant has been closed for inventory and the Wilson Foundry & Machine Co. will close this week for a fortnight for the same purpose. Others are also facing suspension.

Bankers Consider Country's Problems

Motor Truck and Highway Loans Recommended—Lower Pro- duction Costs Coming

WASHINGTON, Oct. 20—Bankers of the country were advised by John J. Pulleyn, president, Emigrant Industrial Savings Bank, New York, and president Savings Banks Association of the State of New York, to recognize the essentiality of loans for motor trucks because of the effect the development of this means of transportation has upon credit. This recommendation was made in an address here to-day before the convention of the American Bankers' Association when 4000 representative financiers heard his appeal for financial assistance to motor transportation which has proved its worth in supplementing railroad service.

The plea of Pulleyn was practically the only direct mention of the automobile industry in the public addresses before the country's leading bankers assembled for the express purpose of exchanging views on present problems, particularly credits. He emphasized the need of improved transportation facilities to relieve credits through liquidation. This objective can only be realized, he said, through capital for new equipment, railroad cars and motor trucks.

As to the relationship of motor trucks to rail transportation, the banker said: "The Car Service Commission, established through the American Railroad Association, was given the study of motor truck transportation as additional facilities for satisfying the demand for transportation. It is interesting to observe the increased use of motor trucks and wagons as supplementary to railroad transportation. The motor roads of the country are fast being improved so that trucks can be used to handle freight within a radius of 60 to 80 miles of cities. Such transportation merits encouragement.

Trade Balance to Be Restored

With the question of price recession and production cost an absorbing topic in the automobile industry it is significant to note the expression of opinion as to this phase as concurred in by committee on gold consisting of George M. Reynolds, president, Continental & Commercial Trust Co., Chicago, as chairman; A. Barton Hepburn, chairman of board, Chase National Bank, New York; and Lawrence E. Sands, president First National Bank, Pittsburgh.

This committee reported to the bankers association that "the present situation of high costs of production is abnormal and temporary. When our wholly abnormal balance of trade is reduced, leaving three or four hundred million dollars worth of goods per month for our domestic markets to absorb, which they have not been absorbing; when labor gets over its illusion that prosperity can be maintained by the shortening of hours and by reduced efficiency, accompanied by

ESPIONAGE SYSTEM IS RULED UNFAIR

WASHINGTON, Oct. 15—Orders have been issued by the Federal Trade Commission against the Oakes Co., Indianapolis, directing it to refrain from certain methods of competition in the manufacture and sale of radiator fans for automobiles, motor trucks and tractors. The commission announced that the conclusion was reached after a full trial.

The order makes specific mention that detectives or other agents must not be placed in competitors' plants for the purpose of ascertaining any trade information, particularly the names and addresses of dealers and data on shipments. The charge was made during the inquiry that the Oakes company had practised a system of espionage which was unfair.

higher wages; and when the strain in our money market is relaxed through reduced extravagance and increased savings on the part of our people, and their Government, most of the present derangements in our industrial system will disappear."

Inasmuch as Oscar Wells, president of First National Bank, Birmingham, Ala., is a member of the Advisory Committee of the Federal Reserve Board—a council which shapes the policies of the organization—it is also interesting, if not significant, to note his explanation of the attitude of the board on rediscounts. It was the question as the eligibility of automotive paper that provoked uneasiness throughout the industry last spring. Wells said of this phase of banking:

"The rediscounting machinery of the Federal Reserve Banks is, of course, available to the member banks located within the territory covered by these two important and essential industries. The remaining question in either case is whether there are sufficient rights of application left for the use of it, to take care of the respective needs for a further expansion, to conserve their uses for food and clothing in succeeding years. To undertake to go beyond the established facilities vouchsafed through the operation of the rediscounting privileges of member banks would be equivalent to undertaking the valorization of these commodities by the use of bank credits."

Roads Essential for Progress

Several bankers urged the development of good roads. The subject was mentioned in the annual address of Richard S. Hawes, president of the American Bankers Association. He declared that good roads were essential to the progress of rural communities, reducing the cost of marketing, and increasing comforts available for the farm. He urged the financiers to render financial assistance to road builders in all sections of the country.

No Change in Policy of Federal Reserve

Process of Liquidating Credits to Continue at Prevailing Re- discount Rates

WASHINGTON, Oct. 18—Definite assurances have been given that the Federal Reserve Board will adhere to its original program of orderly credit deflation. The decision to maintain this position was made after a series of conferences here last week with governors of the Federal Reserve Districts and special agents. It was clearly indicated that in promoting the process of liquidation the board did not contemplate an alteration of rediscount rates.

The persistent hostility of organized farmers forced the board to define its attitude on the present economic situation. It made known its belief that manufacturers and other producers should cultivate domestic markets before developing foreign fields. The board insisted that price disturbances were inevitable and unavoidable consequences of economic derangements occasioned by the war. As to the financial needs of the automobile and other important industries during the price movement, the board insisted that the standard of essentiality must be determined by individual bankers.

The board holds that the credit situation has improved materially as a direct result of the curtailment policy inaugurated last spring. It was pointed out that credit has been steadily available for the successive seasonal requirements of agriculture, as well as for the needs of industry and commerce. While it does not feel that the demand of farmers' organizations for lower extension of credit can, in fairness to industry, be met, the board promises to ration credits on an equitable basis to bring about stability.

Condemn High Interest Rates

The credit situation was further aggravated to-day when the Comptroller of the Currency made specific charges against the practices of New York banks in encouraging undue concentration of capital through high interest rates. He claimed that the unjustifiable interest exacted on demand loans aggregating billions was chiefly responsible for exorbitant rates levied on legitimate industry. The comptroller asserted that this practice tended to reverse the fundamental purposes of the Federal Reserve Act which is to promote orderly distribution of money to meet the needs of the industry and agriculture.

He explained that the high rates offered in New York kept money away from the banks in other cities and towns and thus out of reach of industry. These operations, he said, deprived industrial leaders the money necessary to promote their business. The comptroller suggested as a remedy the maintenance of 6 per cent rate or rates prevailing at other money centers.

Tests Show Effects of Trucks on Roads

Roads Bureau Shows Pneumatic Tire Damage Slight— Try Out Pavements

WASHINGTON, Oct. 18—Impact tests conducted with trucks equipped with solid and pneumatic tires now being conducted by the Bureau of Public Roads to determine the forces exerted by motor trucks have been highly successful. The data obtained are expected to influence highway officials in various states in obtaining a rational basis for calculating license fees for motor vehicles.

To obtain reliable information as to the relative effects of old and new tires from the standpoint of impact on the roadway, the investigators used a 3-ton Packard truck loaded with a 4½ ton load adjusted to make the total weight on each rear wheel 7000 lb., the unsprung portion being 1700 lb. and the sprung portion 5300 lb. An old solid tire worn down to a one-inch thickness was used in the first experiment; a new solid tire 2½ in. thick and then pneumatic tires 42 by 9 in. inflated to a pressure of 142 lb. per square inch completed the assortment.

The results showed clearly that solid tires worn down to one-inch or less damaged the highways while the pneumatic tire produced a relatively light blow. The actual record is given in the following table:

Approximate speed	Height in inches	Old tire	New tire	Pneumatic tire
5.7	2	11,600	9,400	7,100
10.2	2	18,500	14,100	7,800
14.6	2	26,500	18,700	8,300

For the purpose of obtaining accurate measurements the Bureau of Public Roads devised a simple device for producing artificial compact conditions. The impact pressure is measured through the deformation of specially prepared copper cylinders. The blow of the truck deforms the copper cylinder and the magnitude of the blow is expressed in pounds required to deform the cylinder.

To Vindicate Truck Use

The motor truck has been much abused by various councilmen and paving officials in cities where the traffic is heavy. To bring about a clearer understanding of the effects of trucks on various pavement designs, the bureau has tested 49 different types of pavement under extraordinary conditions. A special truck equipped with five cast-iron wheels is being used in this investigation.

Slabs have been subjected to similar tests. A machine designed to give impact conditions resembling those of a heavy truck is used by the highway officials. The unsprung portion of the weight of this machine is 1500 lb. and the sprung portion weighs 6000 lb. The test is made by raising the unsprung weight through a height of one-eighth of an inch, allowing it to fall 500 times,

FRANKLIN INCREASED 400 PER CENT BY CUT

NEW YORK, Oct. 19—The following telegram has been received from H. H. Franklin in response to an inquiry from AUTOMOTIVE INDUSTRIES as to the effect on business of the price reductions made by the H. H. Franklin Mfg. Co.:

"Dealers have maintained over 400 per cent increase in sales since the price cuts, in comparison with a representative period preceding the reduction. Our factory is working a full week as against a four-day week prior to the cut. We are increasing output as rapidly as possible. The principal vendors indicate a willingness to cut material prices, in some cases decreasing immediately without solicitation and in others awaiting exhaustion of present raw materials stocks before reducing."

then to a height of one-half inch with 500 repetitions, then three-eighths inch more in height, and so on until the slab fails. Up to date about 12 slabs have been tested when laid on a rather wet subgrade and there is a surprising difference in the strength of the different types of pavements tested. Thus, the total number of blows required to cause failure have varied with the different slabs from 67 up to almost 2000.

HURLBURT CHANGES HANDS

HARRISBURG, PA., Oct. 18—All interests held by the Hurlburt Motor Truck Co. of New York in the Hurlburt truck have been purchased by the Harrisburg Mfg. & Boiler Co., headed by S. F. Dunkle, which has been making the truck for some time under an agreement with the Hurlburt company. Manufacture will be continued and expanded, especially in the foreign field. Contracts recently have been received from Spain, England, Brazil and India.

MOORE MUST FILE CLAIMS

DANVILLE, ILL., Oct. 18—Creditors of the Moore Motor Vehicle Co. of South Dakota and the Moore Motor Vehicle Co. of Illinois have been directed by the Federal Court for the Eastern District of Illinois to file their claims with C. B. Thomas, the receiver, not later than Dec. 1. Failure to do so will debar them from participating in the distribution of assets.

BUDA DROPS ENGINE PRICES

CHICAGO, Oct. 15—Under date of Sept. 29 the Buda Co., Harvey, Ill., reduced the prices on its engines \$10 to \$15 per unit. This reduction, it is explained in the announcement, was voluntary on the company's part and was done with the idea to endeavor to assist in stabilizing and bringing back the business to normal in the automotive industry.

King Motors Placed in Receiver's Hands

Dissolution of Company Is Asked in Directors' Petition—Banks Declined Loans

DETROIT, Oct. 20—The Detroit Trust Co. was appointed receiver to-day for the King Motor Car Co. upon application of five directors headed by Artemas Ward, Sr. The petition asked for the dissolution of the company and a receivership pending the disposition of the property. The company is capitalized at \$700,000 in common stock. The petition listed the total assets at \$1,835,772 and liabilities at \$1,097,070.

The petition, which was filed with the County Court, cites the plaintiffs "inability to give personal attention to the affairs of the company and lack of additional working capital to continue operation," as the reason for the application. The directors joining with Ward were W. B. Nesbitt of New York, vice-president; Frederick I. Rennert of Boston; Frank W. Deelittle of New York, and Artemas Ward, Jr., president.

News of the failure was not a great surprise in Detroit, as many rumors have been circulated in the last few weeks since the departure of President Ward for New York, ostensibly on account of ill health. His continued absence strengthened the reports of impending failure but officers at the plant squashed them and declared that Ward, Sr. would not permit it even if the business outlook for the time being did not justify continuance of operation.

Sales of the King, particularly in the West, up to the period of financial depression, were large. Production, with limited plant facilities, ranged from 230 to 250 a month until August, when it dropped to 180 and September when it was 150.

The schedule of indebtedness shows that the company was indebted \$548,000 to Mr. Ward, Sr. Bankers say the failure became inevitable on the day when two Detroit banks declined to make loans. Inefficient management is declared to be responsible for the difficulties of the corporation.

H. R. Crusoe, corporation manager of the Detroit Trust Co., is in charge at the plant. He said work at the factory would be continued but he was not ready to say who would be placed in charge of the factory. There are rumors that Barney J. Everitt may head a company to take over the King assets.

RED HEAD FILES PETITION

NEW YORK, Oct. 18—The Red Head Spark Plug Corp., manufacturing spark plugs and parts in this city, has filed a petition in bankruptcy with liabilities of \$54,085 and assets of \$10,428. Among the creditors are: Fox Tool Co., \$17,542; Louis Gerstein, \$14,276; Frenchtown Porcelain Co., \$8,396; Eastern Machine Screw Co., \$3,473.

Grand Prix Tests Waived by Directors

Adopt Regulations Similar to
Indianapolis—American En-
tries Are Expected

PARIS, Oct. 1—(*Special Correspondence*)—Indianapolis conditions have been adopted for the 1921 French Grand Prix race, the first big post-war speed contest to be held in Europe. In adopting a maximum piston displacement of 3-litres and a minimum weight of 800 kilos (1763 lb.) without any preliminary engine test, the Racing Board of the Automobile Club of France has given way to the desires of manufacturers. The original rules, under which no car could start in the race unless its engine had developed 30 hp. at 1000 revolutions and 90 hp. at 3000 revolutions for a full period of one hour, aroused so much opposition in racing circles that if they had been maintained no race could have been held.

To mark his approval of the change, Ernest Ballot filed four entries within an hour of the new rules being announced. These are eight cylinder cars similar to those which competed at Indianapolis this year. Other European firms looked upon as very probable contenders in the big French race are Peugeot, Delage, Bignan, Fiat, Grégoire, Sunbeam, Darracq, Talbot, Voisin, Roland-Pilain and Minerva.

Under the new French rules the minimum weight must be obtained with body, four wheels and tires, with oil in base chamber, but without water, gasoline, tools, spares, or spare wheels. The driver and mechanic must together weigh 264 lb. The only body restriction is that the tail shall not extend further than 20 inches beyond the rear axle. Entry fees have been fixed at 15,000, 26,000, 35,000, 43,000 and 48,500 francs for respectively 1, 2, 3, 4, and 5 cars from the same firm. Entries are received until Dec. 31, and on payment of double fees until Feb. 28, 1921.

Date Contingent on Drivers

The French Grand Prix is a road race over a distance of approximately 500 miles, and probably will be held in Alsace, near Strasbourg. There are half a dozen towns on the waiting list, and a choice will be made after a consideration of the advantages offered by each, both as regards roads and organizing facilities. The date has not been decided on, but probably will be during the middle of the summer and sufficiently late to allow American cars to appear and to permit French drivers to return from Indianapolis.

The 3-litre rule will be the only one employed in Europe next year. There will be six really big races for cars of this size. The first speed contest will be on the Island of Corsica in the early spring. The French Grand Prix, which is the most important speed contest in

PARTS MAKERS KEEN FOR NATIONAL SHOWS

NEW YORK, Oct. 18—All records for the number of parts and accessory manufacturers exhibiting at the national automobile shows will be broken at the exhibitions to be held in New York and Chicago next January. Figures made public by the Motor and Accessory Manufacturers Association indicate that a larger number of parts and unit makers than ever before will take space at the national shows.

Applications for space have already been received by the association from 120 manufacturers for the New York show and from 102 manufacturers for the Chicago show. Altogether, 129 members of the association are scheduled to exhibit.

Europe, may be expected to be held between the middle and the end of July. Belgium will follow with its Grand Prix road race probably in August. There will be a big 500-mile race, modeled on Indianapolis, held on Brooklands track, England, during the month of September, and during the same month the final 3-litre race will be held on a course near Le Mans, France. American cars are counted on to start in some of these.

ITALY MAY RAISE IMPORT BAN

NEW YORK, Oct. 18—Lifting of the restrictions which Italy has enforced against the importation of automobiles is expected to follow the recent raising of import duties, according to information from Rome. The raising of import rates was to remove the former disparity between the Italian duty and the much higher duties of France, Great Britain and the United States. The increase, which already is in effect, exacts a duty, payable in gold, varying with the weight of the machine, and ranging from 20 lira per quintal in the case of cars weighing less than 400 kilos to a maximum of 115 lira per quintal on machines between 400 and 900 kilos in weight. The duty on heavier machines is somewhat less. Automobile bodies are subject to the same taxes as complete machines.

WILLYS EXPORT REORGANIZED

NEW YORK, Oct. 19—Partial reorganization of the John N. Willys Export Corp., which handles the foreign sales on Willys-Overland cars, Republic trucks and other products of the Willys interests, has been completed within the last few days. This action, in which executives and other workers have been affected, followed the return to the United States of John Macfadyean, the vice-president, who had been studying industrial and economic conditions in Europe for the previous six months. The action, it was given out by company officials, was in line with recommendations made by Macfadyean.

Germany Far Behind in Motor Car Field

Manufacturers Seek to Develop
Foreign Trade—Home Mar-
ket for Cars Dead

PARIS, Oct. 4—(*Special Correspondence*)—The state of the automotive industry in Germany is very poor, and the conditions the Germans are having to contend with are undoubtedly full of difficulties. The "home market" may be considered as dead, for the initial cost of cars is so high and operating costs have gone up to such an extent that few can afford to use cars. Compared with America, or indeed with the Allied countries in Europe, the conditions in German cities and on German roads are amazing. During a period of two weeks there I did not see more than half a dozen cars being used for touring purposes, whereas in France or in England hundreds would have been met.

The factories are good and have mainly been rebuilt during the war. In matter of design, however, they stand exactly where they were in 1914, and it can be estimated that they are fully two years behind France and England.

Considerable attention is being paid to export business, and, although manufacturers are struggling against great difficulties at the present time, they are certain to become important factors on the foreign market within the next two or three years. I think the firm which will figure most prominently will be Benz, for they have a good factory and a very vigorous management. There are no airplanes and there is no airplane industry in Germany at the present time. The scares in the Allied press about the German aerial menace are foolish. Germany, however, has a wealth of technical knowledge, and as soon as allowed to do so will come back as a most important airplane producer. BRADLEY.

U. S. TRACTOR BUILDS

MENASHA, WIS., Oct. 18—The U. S. Tractor & Machinery Co. has broken ground for two shop additions, namely, a machine shop, 50 x 200 ft., and an assembling, inspection and shipping building, 75 x 200 ft., which will be of brick and steel construction and be ready about Nov. 15, when the capacity will be increased 100 per cent. With the new facilities, the company also will be able to carry out its plans of enlarging its line of production.

SINCLAIR RECEIVERS NAMED

NEW ORLEANS, Oct. 18—Receivers have been appointed to take charge of the business and plant of the Sinclair Motors Co. George M. and Charles L. Long, stockholders residing in Mississippi, applied for the receivership. The company manufactures an engine invented by Alfred C. Sinclair, president of the organization.

INDUSTRIAL NOTES

Robertshaw Mfg. Co., Youngwood, Pa., is building a brass foundry in connection with its plant for the manufacture of automatic temperature controllers. Ralph C. Swartz has been appointed to represent the company in the Buffalo-Rochester territory.

C. W. Hunt Engineering Corp. has been formed with offices at 143 Liberty Street, New York, to handle sales entailing engineering in connection with Hunt products and to perform engineering services previously in the hands of C. W. Hunt Co., Inc.

Studebaker Corp., South Bend, laid off 400 men who formerly made parts for the 6-cylinder car which is being manufactured in Detroit. Otherwise the company here is running practically full.

Emmitsburg Motor Car Co., Inc., Emmitsburg, Md., has come under the control of Washington and Frederick interests. W. E. Church, new general manager, was formerly in Ford employ.

Moline Pressed Steel Co., East Moline, Ill., will erect an enameling shop and install a large oven, which will give it a capacity of 600 body parts daily. Its work force will be increased.

Biddle & Smart Co., Amesbury, Mass., manufacturers of automobile bodies, has closed down indefinitely, throwing 1500 out of work.

Cincinnati Ball Crank Co., Cincinnati, will be represented in the South by Nichols & De Linde, whose headquarters are in Cincinnati.

Savage Arms Corp. has closed its Sharon plant for an indefinite period. The company had just rebuilt its pressed steel department.

Indiana Silo Tractor Co., Indianapolis, is moving its gear plant to Anderson, Ind., where it will erect additional buildings.

Jefferson Rubber Co., Jefferson, Wis., organized with \$300,000 authorized capital, will have its plant in production by May 1.

Indiana Cord & Tire Co. has moved from Mishawaka, Ind., to Burr Oak, Mich., and will manufacture special inner liners.

Harco Storage Battery Co., East Moline, Ill., has been incorporated with \$100,000 capital to manufacture batteries.

General Motors Acceptance Corp. has moved its executive offices to 120 West Forty-second Street, New York.

Vacuum Muffler Corp. of America is moving its offices and factory to its new building at Bridgeport, Conn.

Nash Motors Co. will pay a quarterly dividend of \$1.75 per share on its outstanding preferred stock on Nov. 1.

Car and Parts Makers Iron Out Differences

DETROIT, Oct. 20—Complete understanding and harmonious co-operation are expected to result from the first of a series of meetings between committees representing the motor vehicle manufacturers and the makers of parts and accessories, which was held here to-day. A give and take attitude prevailed and the interchange of ideas served to iron out differences which have arisen since price cuts on automobiles were announced. The co-operation promised is expected to prove a business stimulus. At the close of the meeting the following

statement was issued by Alfred Reeves, general manager of the National Automobile Chamber of Commerce, and M. L. Heminway, general manager of the Motor & Accessory Manufacturers Association:

"There was a general discussion of present-day problems with reports showing that there had been a recent slight improvement in demand; that stocks are being liquidated in an orderly way and that the early spring will see a generally stable condition.

"The complete understanding between parts makers and automobile manufacturers which has existed for many years was strongly in evidence, both sides agreeing that each should carry a fair share of the burdens of present-day conditions. Complete confidence was expressed that the demand for automobiles and trucks would follow the trend of business generally and would recover as business conditions improve."

Goodyear Stock Drop Laid to Bank Action

AKRON, Oct. 20—Heavy liquidation by banks holding stock of the Goodyear Tire & Rubber Co. as collateral on loans negotiated by employees who bought preferred and common in \$300 blocks last May is held partly accountable for the sudden drop in Goodyear common. Reports of new financing and the fact that the factory is working on a four-day schedule with only 8000 employees also are blamed for the market slump. Goodyear officials were absolutely non-committal to-day on the progress of new financing plans, said to involve \$25,000,000 and on the drop in stock values.

When the employees bought the stock they paid \$75 in cash and many borrowed the other \$225 from Ohio banks. The banks are calling these loans and as the stock purchasers are unable to pay the banks are making a feverish attempt to save themselves from loss.

Many of the high salaried men in the Goodyear organization are retiring. They include C. L. Landon, assistant sales manager; D. M. Caldwell, assistant manager of the truck tire department; C. P. Stearns of the fleet sales department; R. J. West, head of the office employment department, and William Blake, his assistant; T. R. Converse, assistant advertising manager, and Robert Shively of the advertising department. It is understood several of them will join the staff of the American Dunlop Co. at Buffalo.

The Firestone Tire & Rubber Co. reports a considerable increase in its business.

HIGHWAY TRANSPORT PLANS

(Continued from page 829)

The Ways and Means Committee of the permanent committee is planning some evangelistic work to interest teachers in this subject. The first of these meetings will be held under the direction of Dean Bishop in Pittsburgh, Nov. 26, the occasion being the meeting of the Western Pennsylvania Teachers Association.

METAL MARKETS

WITH the pig iron market quoted approximately \$10 lower than a month ago, with sheet bars showing a similar decline and not wanted at that, with finished steel quotations of independent producers nearer to the basis of the United States Steel Corporation's levels than they have been since the latter came into vogue, and with copper, tin, lead, zinc and aluminum at levels which in the case of the two first-named metals correspond to pre-war prices, while in the others they denote heavy declines from the war's peak, it would seem that the momentum of deflation was having full sway. The sore spot that threatens to interfere seriously with the natural course of deflation and reconversion is the continually high price of coal. Big iron makers behold with much anxiety the trend of the steel market, which they know full well calls for a \$35 pig iron market; but, so long as they have to pay \$16.50 @ \$17.50 for coke, they are not very enthusiastic about falling into line. Many of them have made contracts for first half 1921 coke deliveries at \$15 and better, and it is this circumstance that is bound to react on the pig iron market. The coke producers put it up to the coal operators. So that the future course of the coal market furnishes really the key to the iron, steel and metal situation.

Pig Iron—Activity is confined to resale iron, much of which emanates from the automotive industries. These sales are usually small in tonnage and on the basis of the equivalent of \$40, Valley, for basic.

Steel—While some of the independent sheet producers seem determined to make an issue of the irrevocability of their contracts with automotive buyers, others have readjusted their prices for current contracts and brought them more in line with those of the U. S. Steel Corporation, which has received virtually no cancellations or requests for deferred shipments from the automotive trade. Large cancellations of cold-finished steel bars are reported to have been received by Pennsylvania mills from tractor builders. Cancellations are also reported for wire products from manufacturers of automobile cushions. Cancellations for strip steel have ended, the maximum for hot-rolled now being 5.50c. and for cold-rolled 8.50c. Light tonnages of automobile body sheets are said to have been bought in the Cleveland market at around 7.75c.

Copper—Consumers are beginning to show interest at the low levels now in vogue. Resale electrolytic has changed hands at as low as 16c.

Aluminum—Foreign sheet aluminum continues to come in in large lots. The reduction in the price of the American producer has so far failed to stimulate new business.

Tin—When the market went below 40c. consumers began to buy modestly.

Lead—The American Smelting & Refining Company's new price is 7.25c., New York, denoting a cut of \$25 a ton since September 13.

Zinc—Joplin ore producers plan to curtail weekly output to 7,000 tons. The market has seemingly reached bottom.

Brass—Cuts amounting to 1c. to 2c. a pound have been made by brass makers on practically all brass and copper products. In response to requests from automotive manufacturers to scale their prices downward, brass interests have voiced fears that, if prices for copper and zinc decline too sharply, it will mean curtailed production, and therefore an early rebound to higher levels. They also say that the brass industry is not quite in shape yet for a downward readjustment in wages, but they look for lower labor costs early next year.

Automotive Financial Notes

Muskegon Motor Specialties Co., Muskegon, Mich., has been authorized to issue \$200,000 preferred and \$50,000 common stock to provide for additions and enlargements to its plant. The company is said to have \$1,000,000 unfilled orders on its books. The concern was organized in 1909 to build cam shafts.

Cleveland Automobile Co. has retired, through sinking fund operations, 800 shares of preferred stock from a total of 14,900 shares issued in 1919. The company has practically no indebtedness except current trade accounts and contemplates no financing or borrowing of any kind.

Simplex Wire Wheel Co., Cadillac, Mich., will offer for sale \$70,000 of its capital stock, representing the unoffered portion of the \$100,000 approved capitalization. The stock will sell at \$10 and present holders are given preference for 15 days.

Cheboygan Metal Products Co. will increase its capital stock to \$60,000. Directors also have elected D. J. McDonald president; C. L. Rulison, vice-president, and M. J. Cain, treasurer.

Motor Wheel Corp. in its report for the year ended Aug. 31 shows earnings of \$451,000; total assets of approximately \$10,500,000; current assets (including notes receivable), cash and inventories, \$5,372,055.

Armorcord Rubber Co. has increased its capital stock to \$1,000,000 and has declared a stock dividend of 40 per cent on all outstanding stock.

Chandler Motor Car Co. is expected to continue its annual dividend rate of \$10 in view of its current earnings and orders in sight.

Fisher Body Corp. will pay a dividend of 1½ per cent on the preferred stock of the company on Nov. 1, and a dividend of \$2.50 a share on the no-par common stock.

Hendee Mfg. Co. reports for the fiscal year ended Aug. 31 last net after depreciation and taxes of \$759,914, against \$1,356,811 in 1919.

Wright-Fisher Bushing Co. of Detroit has purchased a site at Holly for the erection of a new factory and will break ground immediately for the first unit of the plant.

Hupp Motor Car Corp. will pay a quarterly dividend of 2½ per cent on its common stock on Nov. 1.

Mullins Body Corp. has declared dividends of \$2 on preferred and \$1 on common, both payable Nov. 1.

Packard Motor Car Co. will pay the regular quarterly dividend of 2½ per cent on the common stock on Oct. 30.

Willys-Overland Co. will pay a regular quarterly dividend of 25 cents a share on the common stock on Nov. 1.

Kelsey Wheel Co., Inc., will pay a quarterly dividend of \$1.75 a share on Nov. 1.

Packard Motor Car Co. paid a quarterly dividend of 2½ per cent on Oct. 20.

CRAIG-HUNT IN RECEIVERSHIP

INDIANAPOLIS, Oct. 18—The Craig-Hunt Motors Co., which has been planning to manufacture a small car in this city, has gone into receivership on petition of Chester L. Zachiel, receiver of the Great Northern Health & Accident Co. of North America. John W. Sullivan was named as receiver by Judge

Harry Chamberlain in the Marion Circuit Court.

The complaint alleged that the defendant company was indebted to the plaintiff to the amount of \$125.50 on a promissory note given March 9 and due thirty days later. The complaint placed the assets of the Craig-Hunt company at \$1,000 and charged that the company was in danger of insolvency.

Creditors' Committee Takes Over Gillette

CHICAGO, Oct. 18—Affairs of the Gillette Rubber Co. now are being conducted by a creditors' committee headed by H. R. Kent, vice-president of the Fort Dearborn National Bank. Other members of the committee are H. O. Seymour, vice-president of the Wisconsin National Bank, Milwaukee, and H. H. Merrick, president of the Great Lakes Trust Co., Chicago. This plan of operation has been sanctioned by creditors representing more than two-thirds of the company's indebtedness.

The plan outlined by the committee provides for the appointment of a controller, satisfactory to the committee, whose signature is required on all checks and notes issued by the company; extension of the time of payment of all claims to April 5, 1921, on company notes bearing 7 per cent interest, and full power by the committee at any time to declare the entire indebtedness of the company immediately due and payable. If 25 per cent of the face value of the notes is paid before April 5 next the committee may extend the time of payment to July 5. Under no conditions, however, can the time of payment be extended beyond Oct. 5.

The committee has requested the officers and directors to place their resignations in its hands to be used if necessary. The officers and directors also have been asked to deposit all the shares of stock they own.

BANKRUPTCY SCHEDULE FILED

NEW YORK, Oct. 20—The American Sleeve Valve Motor Co. has filed schedules in bankruptcy with liabilities of \$41,193 and assets \$9,000. The principal creditors include the Rochester Motors Co. and the Dodge Mfg. Co.

REYNOLDS IN RECEIVERSHIP

MT. CLEMENS, MICH., Oct. 18—C. J. Reimold has been appointed receiver for the Reynolds Motor Truck Co. on the application of stockholders and production at the plant has been suspended for the present. The receivership was caused by inability of the company to sell its products. The receiver asserts that assets exceed liabilities, and he has promised the stockholders full protection. The company was organized last October with a capital of \$200,000, furnished by resi-

dents of Mt. Clemens. Operations have been conducted in a rented building and the plant has been in production since spring, making an average of five trucks a month. Reimold will assemble as many trucks as possible from the inventory on hand and endeavor to dispose of them before resuming full operations.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Oct. 21—While commodity price reductions and industrial readjustment continue, the statistics of commercial failures for September show only a slight increase in the liabilities involved over those for August. Reported defaults in September covered liabilities of \$29,554,288, compared with \$28,372,895 in August.

Call money rates ranged from 6 per cent to 10 per cent last week, reacting to a closing rate of 6 per cent on Monday of this week. Time money rates showed little change, increases for some maturities and classes being offset by declines for others.

The outstanding event in the week's money market was the redemption of the outstanding amount of the \$500,000,000 Anglo-French loan which matured on Friday. To this huge turnover were added large operations by the Treasury, including the redemption of about \$65,000,000 of maturing certificates of indebtedness and the payment of interest on one of the Liberty Loan issues. While these operations were reflected in some measure in the call money rates, there was no perturbation in the money market.

The big financial operations of the week were reflected in the statement of the clearing house institutions. Loans and discounts increased \$42,166,000, net demand deposits increased \$95,533,000, and time deposits \$10,385,000. The excess reserves over legal requirements, while still large at \$26,256,020, declined \$9,943,960.

The reserve position of the New York Federal Reserve Bank, on the other hand, showed a slight improvement. Total cash reserves increased \$1,993,926 and net deposits declined \$14,987,577. Total bills on hand and total earning assets registered slight declines.

The combined statement of the 12 Federal Reserve Banks indicates a less favorable technical position as compared with that a week earlier. This was a result, in part, of the large financial operations mentioned above. Cash reserves declined \$3,357,000 and the ratio of gold reserves to Federal Reserve notes, after setting aside 35 per cent against net deposits, declined from 46.9 per cent (week before) to 46.6 per cent last week. Earning assets increased \$19,739,000. Net deposits, on the other hand, declined, due, in great measure, to the reduction in Government deposits and to the increase in the "float" carried as a deduction from gross deposits. Federal Reserve notes in circulation declined \$31,148,000.

Men of the Industry

C. Raymond Messinger, Milwaukee, who was elected vice-president of the American Foundrymen's Association at the recent annual convention held in Cleveland, is widely known in automotive industries. Messinger is vice-president and general manager of the Sivyer Steel Casting Co., and holds the same positions in the Chain Belt Co., of Milwaukee. He also is secretary of the Federal Malleable Co., and is treasurer of the Interstate Drop Forge Co., both located in Milwaukee.

G. L. McCain, who has been prominent in the automobile industry for many years has been made chief engineer for the Saxon Motor Car Corp. McCain started with Packard in 1910 and during the war was placed in charge of Liberty motor design in Washington. After the armistice he was sent to McCook Field, Dayton, Ohio, in charge of final design of airplanes and engines. Leaving there he joined the Lincoln Motor Co., as chassis engineer.

David H. Roberts, Milwaukee, has accepted the position of manager of the sales department of the Latex Tire & Rubber Co., of Fond du Lac, Wis., which is now in production in its new plant, erected and equipped at a cost of about \$500,000. Roberts goes to the Latex organization from the Federal Rubber Co., of Milwaukee. Previously he served in the sales departments of the G. & J., Fisk, U. S. and other large tire concerns of the United States.

Charles H. Potts heads the Potts Motor Sales Co., which has purchased the distribution franchise in Detroit for the Haynes automobile and the company now is moving into its new home at Cass Avenue and Peterboro Street. Don. L. Watson, manager of the Haynes-Detroit Co., will return to the factory at Kokomo.

Delos A. Blodgett, 2nd, of Grand Rapids, has been elected treasurer of the Litscher Lite Corp. of Grand Rapids, succeeding T. J. Barker, resigned. R. B. Harvey, formerly manager of the farm light department for the Westinghouse organization, has been made general sales manager of the Grand Rapids concern.

P. B. Brown has been appointed general sales and advertising manager of the Thomart Motor Co., organized at Kent, Ohio, to manufacture a light commercial car of the speed wagon type. Brown formerly was connected with the sales department of Liberty Motor Car Co., engaged in special work.

Duncan Macdonald has resigned the presidency of the Gearless Motor Corp., Pittsburgh, and is now connected with the Garfield Steam Truck Corp., which plans the manufacture of steam driven trucks, tractors and omnibuses on a large scale.

R. C. Reuschaw, who resigned recently as vice-president of Mitchell Motors, has rejoined the Reo organization as general sales manager. He was formerly in charge of the Reo sales organization and his return to that company has been welcomed.

Lawrence W. Robert, Jr., Atlanta, has been appointed consulting engineer for all of the American textile developments planned by Dunlop American, Ltd., the United States organization of the Dunlop Rubber Co., of Birmingham, Eng.

J. D. Mooney, until recently assistant to A. P. Sloan, Jr., vice-president of the General Motors Corp., has been made general manager of the Remy Electric Division, General Motors Corp., and will be located at Anderson, Ind.

Reuben Kuempel has been added to the engineering staff of the tractor bearings division of the Hyatt Roller Bearing Co., Chicago. He was formerly tractor engineer with the General Ordnance Co., New York.

H. L. Archey has been appointed sales manager for the ignition products of the Philbrin Corp. This work to this time has been handled by E. S. Philips, president of the company.

Edgar H. Gorsuch, formerly of Firestone, has been appointed chief chemist of the Mason Tire & Rubber Co., Kent, Ohio. He succeeds A. H. McGachan, who goes to Columbus.

W. H. Herbert has been made manager of the new Detroit branch of the Denby Truck Co. L. B. Miles, factory service director, will supervise the service end in the branch.

Lincoln T. Kauffmann, formerly president of the Automobile Leather Mfg. Co., Arlington, N. J., has joined the staff of Hughson Merton, Inc., factory sales representatives.

Harry M. Pyke, formerly sales manager of the Marmon-Long Island Co., has joined Hare's Motors, Inc., as a special representative. He will cover New York State.

H. B. Ritner, of New York, has been appointed South American representative of Columbia Motors Co. He was formerly with W. R. Grace and other export firms.

A. A. Brevaire has been appointed chief maintenance engineer of Hare's Motors, Inc. He was formerly a technical engineer with the Pierce-Arrow Motor Car Co.

Dan Gilkey, Pacific Coast representative of the Acason Motor Truck Co., has been promoted to the position of vice-president in charge of sales and advertising.

Wayne S. Pickell, formerly with the Studebaker Corp., has been made sales manager in the carriage division of the Packard Motor Car Co., Detroit branch.

F. M. Jamieson, former purchasing agent for the Wire Wheel Corp. of America, has been made manager of the Detroit branch of the company.

R. A. De Villeg has been appointed chief engineer and factory manager of the Handley-Knight Co. He was formerly with Dodge Bros. and Cadillac.

William F. Blaha has been promoted to the position of acting sales manager of the Available Truck Co., of Chicago.

L. W. Cash has resigned as purchasing agent of the Defiance Motor Truck Co., Defiance, Ohio.

Court Upholds Hexter in Day-Elder Suit

NEWARK, N. J., Oct. 21—Decision that the Day-Elder Motors Corp. had broken its contract with Percy K. Hexter, sales manager, as given in New Jersey Chancery Court, has been upheld by the Court of Errors and Appeals. Damages in the suit will now be determined by trial in United States District Court.

Hexter, as sales manager of the company, located sales offices in New York. While he was in military service the company removed the sales offices to the factory. Upon resuming his position Hexter insisted that he be permitted to

relocate in New York. The company would not permit this and Hexter was dismissed.

The New Jersey courts decided that the sales contract did not dictate where the sales offices were to be located, and that Hexter was entitled to open them as he saw fit, providing he met with the terms of the contract as to quantity of sales. The court also decided that Hexter was entitled to hold 5000 shares of stock given him with the proviso that he meet his contract obligations.

FLANDERS REPORT DENIED

CHICAGO, Oct. 18—A report that Walter Flanders had taken charge of the All-American Truck Co. was denied at the factory here to-day, although the impression was given that such an appointment might be made at some time in the future. The financial affairs of the company are said to be showing improvement and although not all the creditors have agreed to the proposal for a continuance of business without a receivership, it is not expected a receiver will be named.

SUPREME MOTORS GETS FUNDS

YOUNGSTOWN, OHIO, Oct. 18—Additional finances for development of the Supreme Motors Corp., Warren, Ohio, amounting to \$500,000, is available according to announcements made this week. Part of the new funds cover indebtedness resulting from the recent sharp depression in the automobile business but the largest portion of it was for production purposes. The company has on its books a number of valuable orders for its motor.

ADELPHIA IN RECEIVERSHIP

PHILADELPHIA, Oct. 18—Winfield Barnes Co., manufacturer of automobiles and accessories, were forced into Federal receivership to-day because, attorneys said, the company had insufficient capital to continue. The company made the Adelphia cars for export. The slump in the money market placed it in financial straits. Assets were given as \$606,960 and liabilities as \$208,806. Available cash was only \$757.

BALTIMORE RECEIVER NAMED

BALTIMORE, MD., Oct. 18—Frederick J. Schlosstein, an attorney, has been appointed receiver for the Baltimore Rubber Tire Mfg. Co. under a bond of \$50,000. The company was incorporated in 1916. A receiver was asked by Slaysman & Co. with a claim of \$16,118. The assets are said to exceed the liabilities.

WRENCH RECEIVERS APPOINTED

WORCESTER, MASS., Oct. 18—Walden-Worcester, Inc., manufacturers of wrenches, have been thrown into a receivership in a friendly action instituted by George F. Blake & Co. Operations at the plant will be continued as usual and the company is entirely solvent, with assets \$300,000 in excess of liabilities.

Calendar

SHOWS

- Nov. 14-21—New York, Automobile Salon, Commodore Hotel Ballroom.
- Nov. 15-20—Chicago, Automotive Equipment Show, Coliseum, Automotive Equipment Association.
- Dec. 10-18—New York, Motor Boat Show, Grand Central Palace.
- Jan. 3-8—New York, Motor Truck Show, Motor Truck Ass'n of America, Twelfth Regiment Armory.
- Jan. 8-15—New York, National Passenger Car Show, Grand Central Palace, Auspices of N.A.C.C.
- Jan. 14-21—Milwaukee, Annual Automobile Show, Milwaukee Automobile Dealers' Ass'n.
- Jan. 22-29—Cleveland, Annual Passenger Car Show, Cleveland Mfr's & Dealers' Ass'n, Wigmore Coliseum.

- Jan. 22-29—Montreal, Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.
- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.
- Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.

FOREIGN SHOWS

- October—London, Commercial Vehicle Show, Olympia.

- Nov. 4-13—London, International Motor Exhibition, Society Motor Mfr's and Traders, Ltd., Olympia and White City.
- Nov. 6-13—Christchurch, N. Z., Olympia Motors Exhibition.
- Nov. 29-Dec. 4—London, Cycle and Motorcycle Show, Cycle and Motorcycle Mfr's and Traders Union, Ltd., Olympia.
- Jan. 7—Sydney, Australian Motor Show.
- Jan. 22-29—Colombo, Ceylon Motor Show.
- Feb. 7—Delhi, India, Delhi Motor Show.

CONVENTIONS

- Nov. 9-11—Cleveland, Service Managers' Convention, National Automobile Chamber of Commerce.

RACES AND TOURS

- Nov. 25—Los Angeles, Thanksgiving Day Speedway Classic, Beverly Hills Speedway.

Merger Plans Progress on Maxwell-Chalmers

NEW YORK, Oct. 18—More than 70 per cent of all classes of stock of the Maxwell and Chalmers companies had been deposited under the reorganization plan last Friday night, the final date established by the committees of the two corporations. The proportion of Chalmers stock deposited was larger than that of Maxwell securities, reaching nearly 85 per cent. The response of stockholders was more generous than under the old reorganization plan which was renewed several times and finally abandoned.

The date for the initial payment of 10 per cent of the purchase price of the maximum amount of new stock offered for purchase under the plan has been extended until Oct. 27 and a formal announcement by the committee of management, headed by Walter P. Chrysler, is not expected until after that time. There is every reason to believe, however, that the plan will be declared operative. Bankers are ready to underwrite the new stock which it is proposed to issue if all of it is not subscribed by present stockholders.

PRICE CHANGES

Price reductions have been made this week by the Nelson Motor Truck Co., Saginaw; the Atlas Truck Corp., York, Pa., and the Carlisle Tire and Rubber Co., Carlisle, Pa. The Carlisle reductions range from 10 to 25 per cent on all its products, and it will maintain its scale of wages to employees.

Atlas makes a flat reduction on its truck chassis price, listing it now at \$1655. The Nelson company notes that its new prices do not indicate an actual reduction but a change in its sales policy. Formerly its product was sold with many extras as standard equipment at a

flat price. Under the new arrangement the truck chassis can be bought with standard equipment only or with as many extras as ordered. The new policy makes a change in chassis price ranging from \$360 upward.

Winther Motor Truck Co., Kenosha, Wis., has issued notice that it will guarantee present prices on all its truck models to Aug. 1, 1921.

To Lay Out Highway Cleveland to Akron

CLEVELAND, Oct. 18—In anticipation of the time when Cleveland will be a port open to the ocean and Akron products will be shipped direct to points overseas through this city, steps were taken here for the building of a great inter-city thoroughfare between Akron and Cleveland.

The project was considered at a meeting in the Cleveland Chamber of Industry with representatives from this city and Akron in attendance. H. M. Farnsworth, chairman of the Metropolitan Park Board of this city, was delegated to appoint a committee of three to proceed at once to planning for the new thoroughfare, which will follow the bed of the Cuyahoga River into Akron.

TIRE MERGERS GOOD MOVE

YOUNGSTOWN, OHIO, Oct. 18—Merger of a number of the leading rubber manufactories would be highly beneficial to the entire industry in the opinion of E. F. Jones, president of the Republic Rubber Corp., expressed in comments on the published reports that the Morgan interests have under way a purposed combination of the U. S. Rubber and Goodrich companies.

Removal of much excessive competition would be one of the big results of the combination which in itself, in the estimation of Jones, would have a large effect in preventing recurrence of conditions that have recently been demoralizing to the tire manufacturing business.

Educational Features Set for Tractor Show

COLUMBUS, Oct. 16—More than 60 per cent of the available space for the National Tractor Show, which will be held here Feb. 6 to 12, under the auspices of the Columbus Tractor & Implement Club has been sold. One of the features of the show will be the educational sessions. This work has the active co-operation of the faculty of the College of Agriculture of the Ohio State University. On the program will be found the outstanding authorities in agricultural engineering in the entire United States. In addition to lecture courses, mass meetings will be held at night to be addressed by men of national prominence in agriculture.

In connection with the educational sessions and mass meetings it is planned to have each exhibitor take a part in the educational program to the extent that he will not only install a service booth, where this is practical, but will also build into his exhibit some educational idea. Where this matter has been taken up by exhibitors, it has been received with great enthusiasm. It is safe to say that the 1921 tractor show will be the best from every standpoint and especially from the standpoint of educating the farmer.

GOODYEAR BUILDS DIRIGIBLE

AKRON, Oct. 18—The airship division of the Goodyear Tire & Rubber Co. has completed the dirigible D-2 for the United States navy which will be sent to Langley Field within a short time. The dirigible will make the trip under its own power, which was demonstrated in flights over the city several times within the past few days. The envelope measures 200 feet in length and the engines are capable of making a speed of 55 miles an hour for a continuous flight of 24 hours. A week will be spent in taking the D-2 to Texas in easy stages.